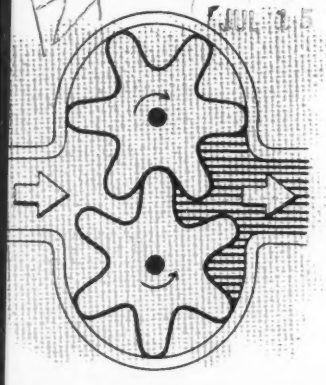
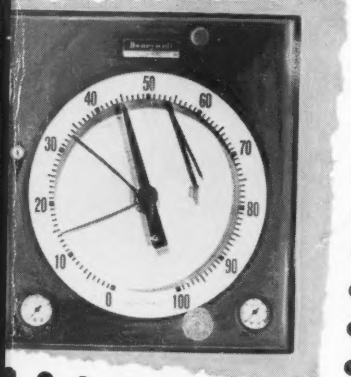
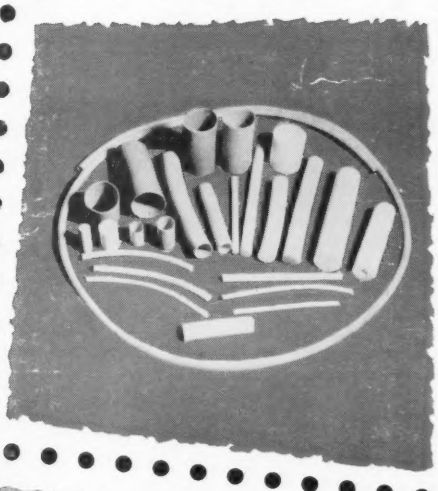
Design Engineering

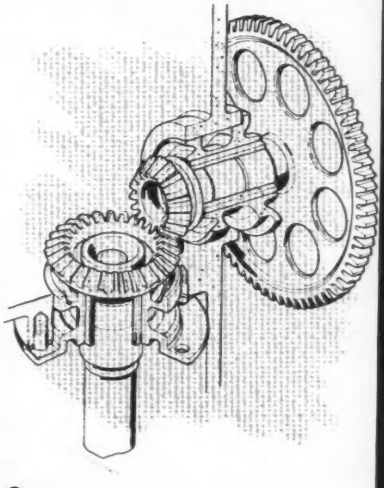
FIVE DOLLARS A YEAR

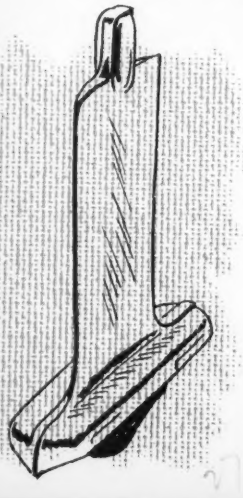
13983
JUL 15 1957











July 1957

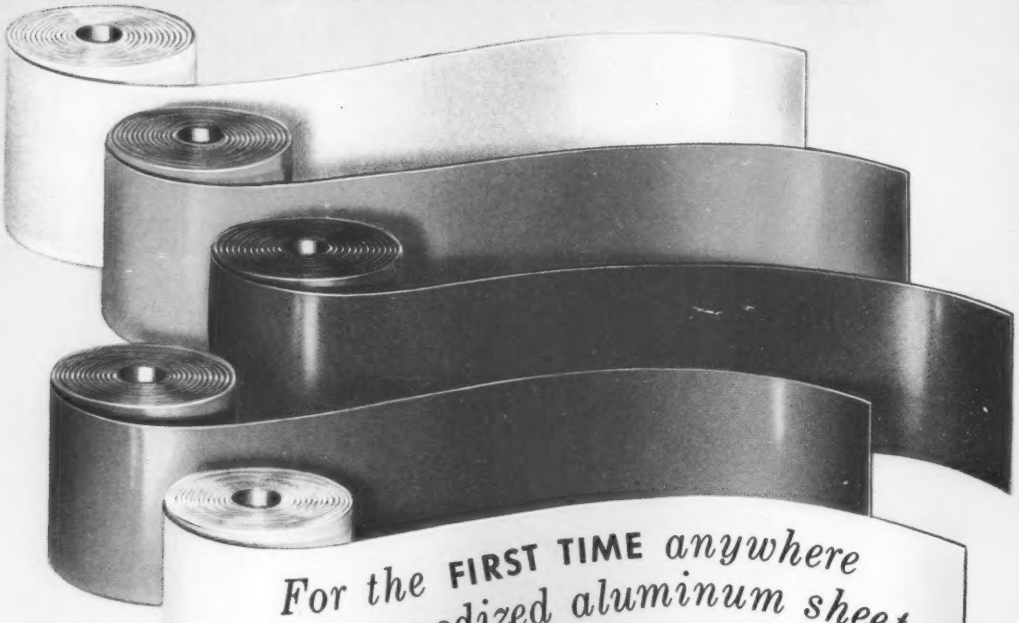
Component application guide

A feature editorial report

PUBLISHED BY MACLEAN-HUNTER
PUBLISHING COMPANY, LIMITED, TORONTO, CANADA

INTRODUCING ALCAN

"COLORCOIL"



For the **FIRST TIME** *anywhere a color anodized aluminum sheet in coils...*

at practical prices!

ALCAN is proud to announce the availability of this new color anodized aluminum sheet, with one side anodized in continuous form. It is an all-Canadian development, offered at far lower cost than has previously been possible with any anodizing process.

In addition, it offers *improved* quality: can be stamped or formed better than any other anodized material; has greater uniformity of color and superior scratch resistance, with six fade-resistant colors for outdoor use.

Available plain or embossed in rolls up to 48″ wide, in gauges from .020″ to .064″ and in a variety of alloys to suit a variety of applications. For complete information and samples, ask any Alcan Sales Office, or fill in and mail this coupon . . .

ALCAN

ALUMINUM COMPANY OF CANADA, LTD.

CALGARY HALIFAX HAMILTON MONTREAL OTTAWA
QUEBEC TORONTO VANCOUVER WINDSOR WINNIPEG

ALUMINUM COMPANY OF CANADA, LTD.
1700 Sun Life Bldg., Montreal

Please send me informative brochure, with samples, giving complete details of your new "COLORCOIL" continuously anodized aluminum sheet.

*Name*_____

_____

*Address*_____

Design Engineering

VOL. 3 JULY 1957 No. 7

This month's cover

Wanting to depict our Component Application Guide we turned the cover job over to Al Vivash and Eloise Smith. They came up with an irregular checkerboard design featuring some of the components from the sections the July issue covers, all done up in a snappy shade of red. Supposing it does look like Christmas? Just what we needed to cool us off in the mid-June Toronto doldrums.

Design Engineering

MEMBER

CCAB

Authorized as second class mail, Post Office Department, Ottawa.

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Instrumentation and controls	E
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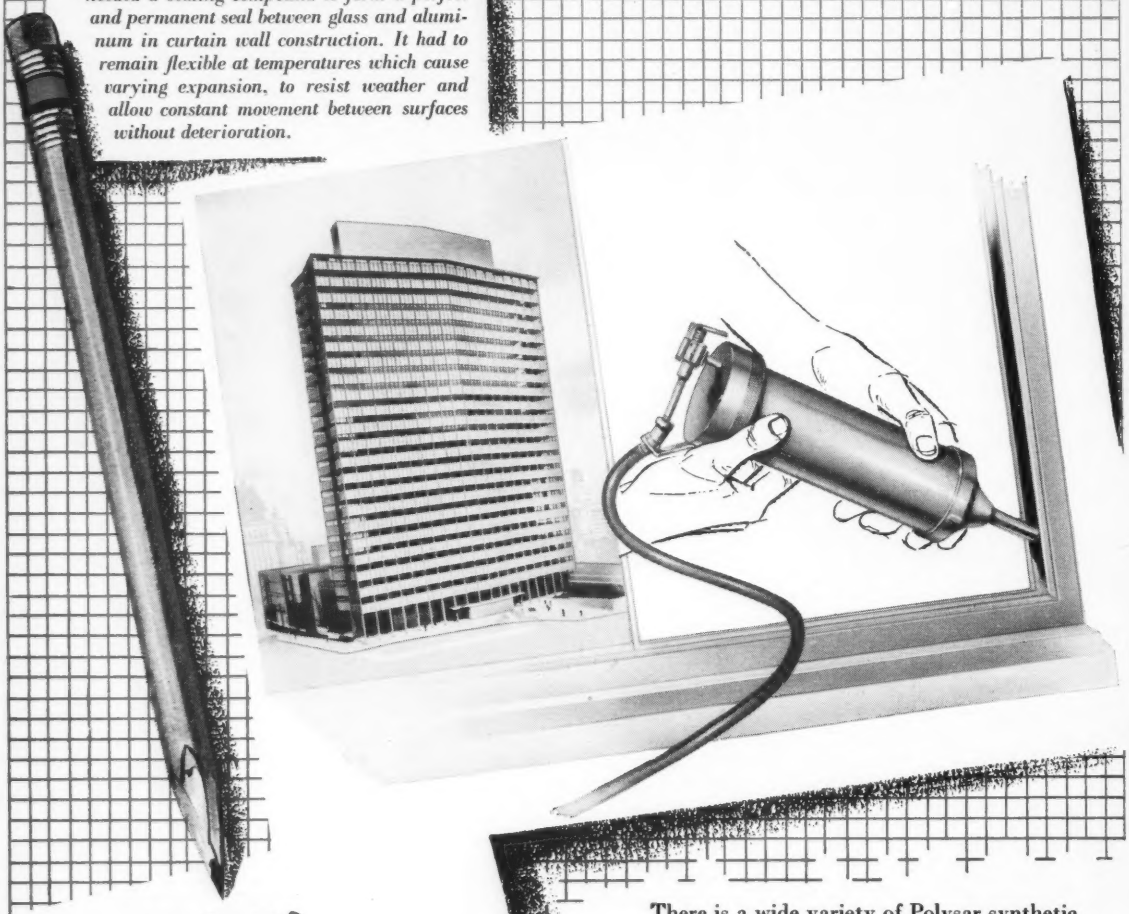
Problem:

North Western Supply Company, of Vancouver, needed a sealing compound to form a perfect and permanent seal between glass and aluminum in curtain wall construction. It had to remain flexible at temperatures which cause varying expansion, to resist weather and allow constant movement between surfaces without deterioration.



Solution:

Polysar Butyl 301 proved to be the answer to North Western's exacting sealing problem. As the base for Norwescoseal 566, Polysar Butyl 301 imparts the essential qualities of permanent adherence in all weather between the sealing compound and materials of varying physical qualities under repeated flexing.

POLYMER CORPORATION LIMITED
POLYSAR
SARNIA CANADA

*Trade mark registered

There is a wide variety of Polysar synthetic rubbers from which to select the one best suited to a particular application. The Sealant, based on Polysar Butyl 301 is just one example of the many uses for these rubbers. In countless industries—myriads of products are being improved and enlarged upon by Polysar synthetic rubbers.

Regardless of your field, it may be that Polysar synthetic rubber can solve your technical problem. Write to our Sales and Technical Service Division, Polymer Corporation Limited, Sarnia, Canada.

POLYMER CORPORATION LIMITED
SARNIA • CANADA

Inside

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DIRECTOR, BUSINESS PUBLICATIONS

In our next issue

1. Sleeve bearings.
2. Ductaluminum 356.
3. Ferrous clad metals.
4. A new Army vehicle.
5. De Havilland's Caribou.
6. Brazing stainless.
7. Steam heat treating.
8. Blade charts.
9. Fluid couplings.

Here's how you find your way around this issue

Designed to be of practical help to you in the selection of the innumerable components that fuse into a finished product, this issue is (as we've said on the cover) a **component application guide.**

It's by no means the whim of **Design Engineering's** staff; it is in fact the result of the strong promptings of your answers to the questionnaires which we sent to you recently. Here is the guide that **you** asked for.

Since an issue of this type is useless unless effective in action, we have given a powerful amount of thought to a simple method of (a) indexing, and (b) getting your requests and queries on featured items to their manufacturers and suppliers in short order. We think the result is a happy one and no readers should lose themselves in a complicated maze of double indexing and cross-references.

All items appearing in this issue are listed in one of ten broad sections (see page one for these). Each section has been given an initial letter for fast identification within the body of the book—A, B, C . . . and so on up to the tenth section which is section J.

The sections all start on a right-hand page and the lead page of every section is in color. At the top right of these color pages the section letter is repeated in large type and the section's full name appears again across the centre.

Listed on that page are all the items appearing within the section and each item is followed by a bracketed three-figure number, thus (592). This number appears again twice; once at the end of the text of the item itself; again on the pre-stamped cards which you can tear out of pages 85 and 86.

If you want more information on any of the items in this issue all you need do is:

1. Make a note of its reader service card number;
2. Circle the same number on the card on pages 85 and 86 and add your name and address;
3. Mail the card.

That's all there is to it.

Your name and address will be forwarded to the manufacturer or supplier who will send full information direct to you. This service is absolutely free. **Design Engineering** does the work and pays the postage.

QUALITY Glidden PRODUCTS

FORMULA FOR SUCCESS: MIX RESINS WITH IDEAS

What you see here in the modern Glidden Laboratory is a step in the experimental development of synthetic resins. But there's more to such research than meets the eye.

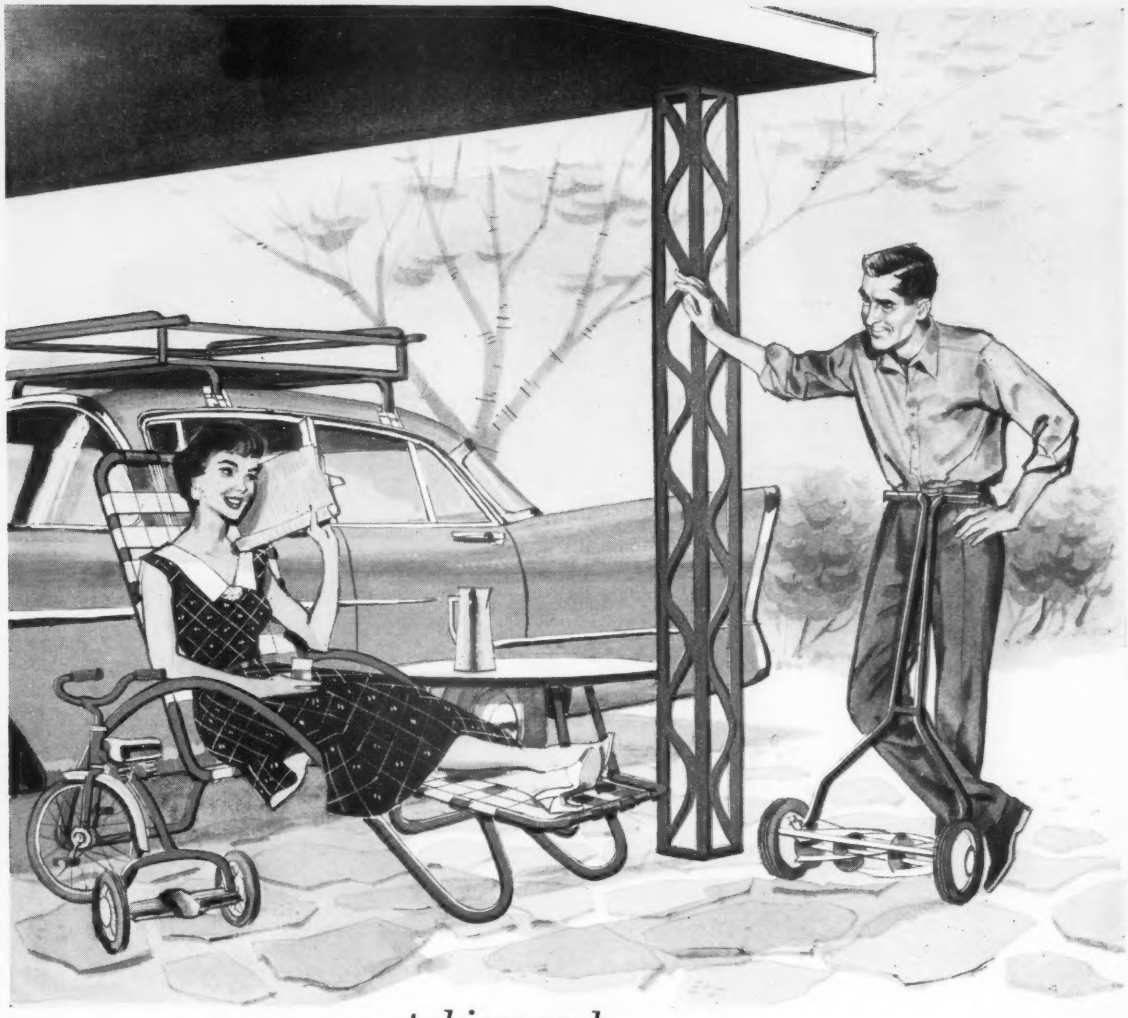
Many tests may be made before the right formula is found. And many more tests will follow before the new product is marketed. But this is not just routine work. Successful results are obtained only when research is done by men with experience, skill and a *creative approach* to problems. At Glidden, research *is creative.*

This kind of service can be very valuable to you. So can Glidden Technical Service. For experts from this department are constantly developing and testing more effective methods of *applying* all types of industrial product finishes. And they will help you with such problems right in your own plant.

These and other helpful Glidden services are at your command. Why not use them at the next opportunity?

INFORMATION YOU'LL VALUE!
This Booklet outlines all Glidden Technical and Laboratory Services—and how you can profit by them. We will gladly send a free copy to plant executives on request. Just write to:

THE GLIDDEN COMPANY LIMITED Technical Service Department, 351 Wallace Ave., Toronto, Ont.

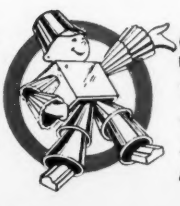


tubing and
tubular fabrications

from **STANDARD TUBE** *contribute more and more to modern living comfort!*

Lawn Mowers—Car-Top Carriers—Tricycles—Lawn Furniture—Car Port Pillars
Every day, engineers make further use of steel tubing in the many products that make our living easier, more comfortable, and more pleasant.
"Standard Tube" supplies finest quality steel tubing to Canadian industry plus an engineering research staff to help meet every requirement with exactly the right material.
Write or phone for immediate service.

STANDARD TUBE STANDS FOR ALUMINUM, TOO!
Sheet, Bar, Extrusions, Tube and Wire—available in any quantity.



STANDARD TUBE AND T. I. LIMITED

WOODSTOCK • TORONTO • OTTAWA • MONTREAL

WELDED AND SEAMLESS STEEL TUBING • FABRICATIONS • ALUMINUM • MATERIALS HANDLING EQUIPMENT • SCHOOL AND NESTING FURNITURE

Member of Formed Steel Tube Institute

NEW GOLDEN BONDERITE

How its golden color can mean better products, greater profits for aluminum fabricators

The golden coating achieved on aluminum by new Golden Bonderite is the key to a whole new concept in control, economy and efficiency.

No longer need you worry along with variations in coating weights and solution analyses that go up and down from hour to hour or day to day. The color of the metal as it emerges from the Bonderite machine is a visual check on solution effectiveness and coating quality. It looks the same—and it is the same—24 hours a day, seven days a week.

Parker "Reactifier" and How It Works

In ordinary surface treatment solutions of this kind, a build-up of impurities occurs as work is processed. These impurities affect the efficiency of the treatment in inverse ratio until finally the solution is beyond redeeming. The tank has to be dumped and a fresh bath made up.

This costly, wasteful procedure is ended when you use Golden Bonderite in conjunction with the sensational Parker "Reactifier" column, an exclusive apparatus that polices the solution constantly, removing the harmful elements and allowing you to use the solution indefinitely, without ever having to discard it.

Better Products, Better Profit

You use a surface treatment for your aluminum production to improve paint adhesion and corrosion resistance, to reduce rejects in the finishing department and to assure customer satisfaction. Uneven efficiency in surface treatment usually means loss of paint adhesion, production rejects and the danger of costly field service and replacements.

Golden Bonderite's uniform efficiency, so easily checked by color, will save you money.

1 It provides a uniform, effective paint base.

2 It allows you to schedule and maintain high production levels.

3 It permits operation at uniform low chemical concentrations.

4 It eliminates the need for dumping and rebuilding treatment solution.

Straight-as-a-string solution analysis

The saw-tooth line above is entirely too familiar to operators of conventional aluminum treatments. Efficiency sags as metal is treated, recovers as chemical is added, quickly sags again in use. Quality is uneven and uncertain.

New Golden Bonderite and the amazing new "Reactifier", developed by Parker, bring "straight-as-a-string" efficiency. No variation in quality even if you operate 24 hours a day, seven days a week. Solution analysis remains constant, free of impurities that reduce efficiency and quality.

Simple To Use

New Golden Bonderite may be applied by spray or immersion. Treatment time can be varied to suit production speeds and equipment. Golden Bonderite comes to you in concentrated liquid form, easy to handle and use.

Let us show you actual samples and test data on Golden Bonderite for aluminum. Call or write today!

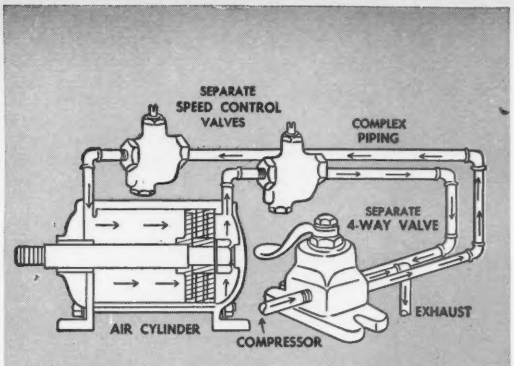
NOTE: *A companion product to Golden Bonderite produces an appealing scratch-resistant green coating on aluminum. It's a lovely color without further finishing. A natural for architectural products.*

Since 1914— leader in the field

PARKER RUST PROOF COMPANY OF CANADA LTD.
Rexdale Blvd., Rexdale, Toronto, Ontario

BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

**Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.*



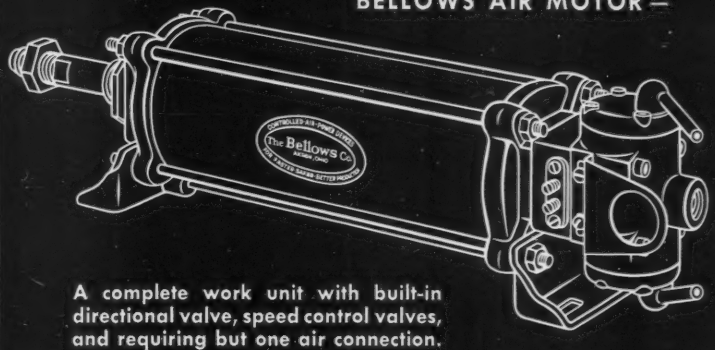
CONVENTIONAL AIR CYLINDER

ONE LOOK

and you can see the

SAVINGS

THE COMPACT, STREAMLINED BELLOWS AIR MOTOR—



A complete work unit with built-in directional valve, speed control valves, and requiring but one air connection.

Design engineers looking for simplicity and economy in air circuit installations will find a quick answer in the two circuits sketched in this ad. One shows a conventional air circuit with separate air cylinder, separate speed control valves, separate directional valve and the piping required to install the circuit. The other shows the Bellows Air Motor—the complete air cylinder package—with directional valve and speed control valves built in, and its single air connection.

But simplification of design and installation problems is actually one of the less important advantages this compact power unit offers. The big advantages are precision control and improved performance. Response is lightning fast; action is smooth and positive. And coupled with improved performance is minimum maintenance —less time out for servicing.

The Bellows Air Motor offers you a choice of ***built-in*** directional valves: 8v or 110v electrical control, explosion-proof electrical control, manual control, or pilot valve control—in five bore sizes: 1″, 1¾″, 2½″, 3⅝″ and 4½″, and in any stroke length.

This new four-color, 24-page bulletin gives full technical data on Bellows Air Motors.

It is free on request. Ask for BM-25. Write Dept. DE 757 Bellows Pneumatic Devices of Canada, Ltd., 14 Advance Road, Toronto, Canada.

Bellows

PNEUMATIC DEVICES OF CANADA, LTD.

14 Advance Road • Toronto, Canada

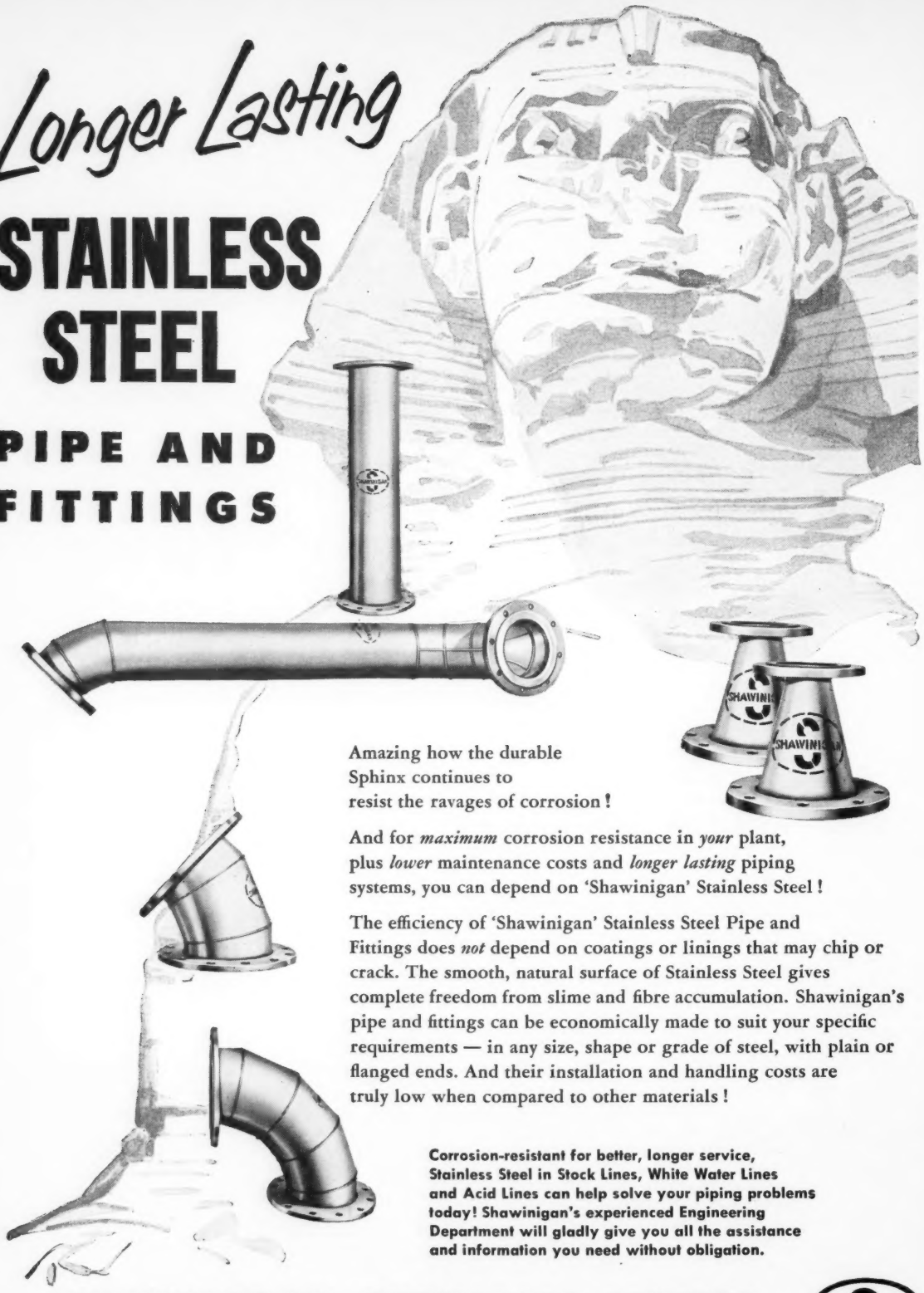
1379A-1

FIELD ENGINEER OFFICES IN EVERY INDUSTRIAL AREA IN THE UNITED STATES AND CANADA

Longer Lasting

STAINLESS STEEL

PIPE AND FITTINGS



Amazing how the durable Sphinx continues to resist the ravages of corrosion!

And for *maximum* corrosion resistance in *your* plant, plus *lower* maintenance costs and *longer lasting* piping systems, you can depend on 'Shawinigan' Stainless Steel!

The efficiency of 'Shawinigan' Stainless Steel Pipe and Fittings does *not* depend on coatings or linings that may chip or crack. The smooth, natural surface of Stainless Steel gives complete freedom from slime and fibre accumulation. Shawinigan's pipe and fittings can be economically made to suit your specific requirements — in any size, shape or grade of steel, with plain or flanged ends. And their installation and handling costs are truly low when compared to other materials!

Corrosion-resistant for better, longer service, Stainless Steel in Stock Lines, White Water Lines and Acid Lines can help solve your piping problems today! Shawinigan's experienced Engineering Department will gladly give you all the assistance and information you need without obligation.

SHAWINIGAN CHEMICALS LIMITED

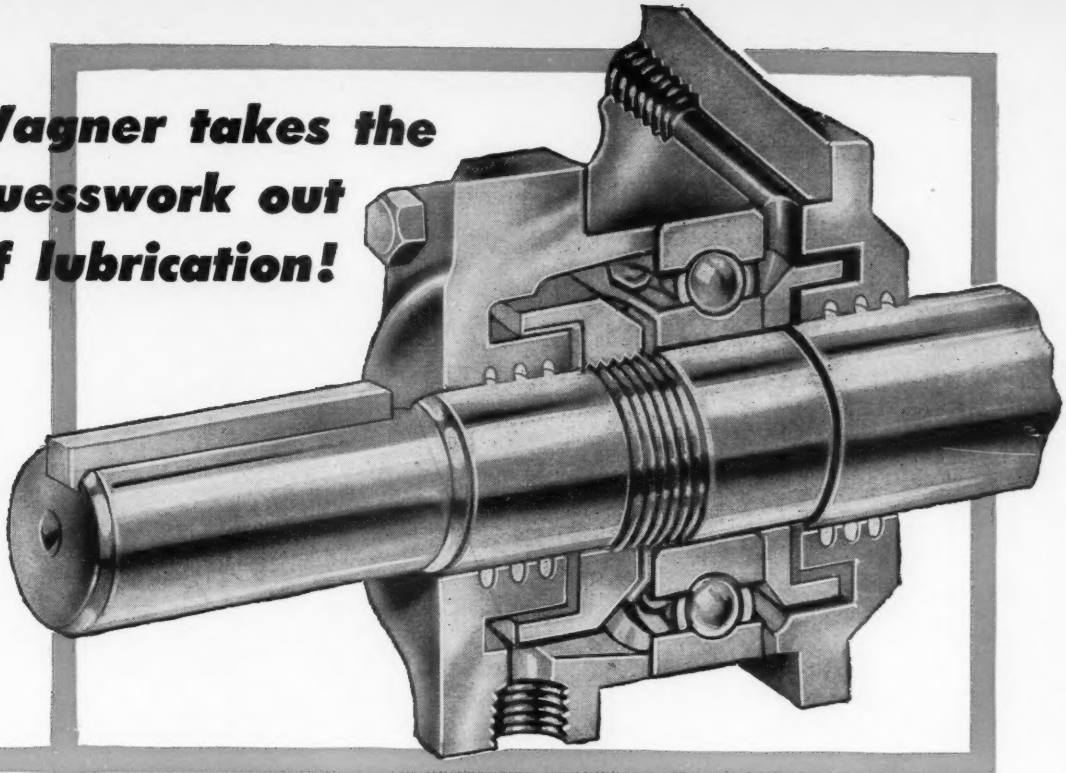
STAINLESS STEEL AND ALLOYS DIVISION

Head Office: Shawinigan Building, Montreal, Que. — Plant: Shawinigan Falls, Que.

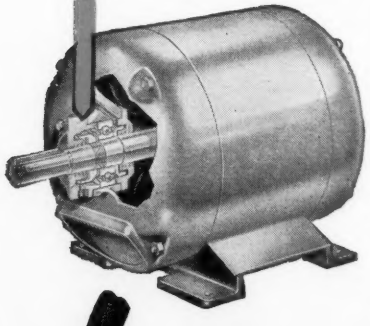
SHAWINIGAN

TRADE MARK REGISTERED

Wagner takes the guesswork out of lubrication!



EFFICIENT LUBRICATION UNDER ANY OPERATING CONDITION



Here's a feature pioneered by Wagner Motors that actually guarantees efficient lubrication under *any* and *all* operating conditions. It's the remarkable Wagner *Transverse System* of greasing motor bearings. The specially-designed labyrinth grooves, the close-tolerance running fit, the special grease . . . all combine to provide a "lifetime" of trouble-free operation under normal conditions without regreasing. Yet under adverse conditions, where dust and dirt are excessive, the bearing can be easily re-lubricated without removing the motor from the job. All old bearing lubricant is flushed out through handy grease plugs . . . leaving only fresh, grit-free grease.

Whatever your motor requirements, you can always count on Wagner for rugged dependability and continued efficiency under *all* operating conditions.

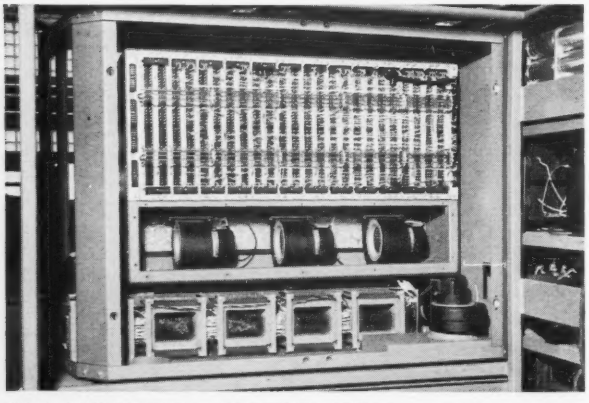
Wagner ELECTRIC

Head Office:
LEASIDE, ONTARIO
Division of:
SANGAMO COMPANY LIMITED
PLANTS: LEASIDE, ONT.; THREE RIVERS, P.Q.
Sales Offices:
TORONTO • MONTREAL • WINNIPEG • EDMONTON
Also sold by Northern Electric Co. Limited

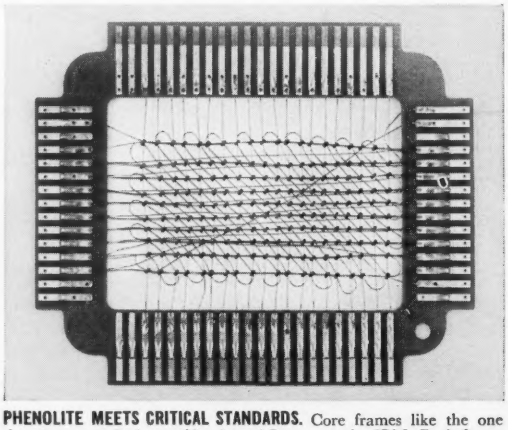
P 3980

THE NATIONAL SCENE

KEEPING "ELECTRONIC BRAINS" FROM LOSS OF MEMORY. One of science's greater marvels is IBM's 705 Electronic Data Processing Machine—which makes intricate calculations and logical decisions in millionths of a second. Heart of this electronic "wizard" is its main magnetic core memory. Designed for use with the machine's high-speed printer is the IBM 760 Control and Storage Unit containing its own core memory of 1,000 positions which allows central processing to continue in the 705 while other data are being printed. Helping the 760 remember what information is to be printed is a job for PHENOLITE® Laminated Plastic. PHENOLITE's unique combination of properties makes it ideal for this application.



MOST ADVANCED FORM OF ELECTRONIC STORAGE. The 1,000-position core memory for the IBM 760 Control and Storage Unit—a portion of which is shown here—consists of pinhead size cores strung on copper-wired frames of PHENOLITE. Electrical impulses, passing through wires, alter the magnetic state of cores so that a group of them stands for a word or figure. Reversing the process recalls information from storage. PHENOLITE frames safeguard the circuit and permit stacking of core planes as shown.



PHENOLITE MEETS CRITICAL STANDARDS. Core frames like the one shown are punched out of laminated PHENOLITE by IBM. Each frame has printed circuit type terminal strips and soldered connections. PHENOLITE proves an ideal material for this application because it is mechanically strong and stiff, punches cleanly, etches well, remains flat, has high dielectric properties and withstands the heat of dip soldering.

NATIONAL CAN HELP YOU reduce unit product cost or improve product performance at no added cost. Here's why . . . You can select the "one best material" from over 100 grades of PHENOLITE, Vulcanized Fibre and National Nylon—without compromise in properties or cost. You can simplify production and purchasing with the timed delivery of 100% usable parts—from a single reliable source. You gain competitively with National's new materials and grades—the direct result of programmed materials-research.

You benefit by calling National first. Check Telephone Directory Yellow Pages, or write Toronto—Dept. N7.

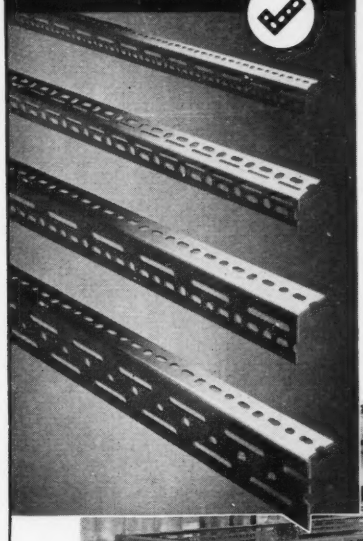
NATIONAL

NATIONAL FIBRE COMPANY OF CANADA, LTD.
ATLANTIC & HANNA AVENUES, TORONTO
1411 CRESCENT STREET, MONTREAL

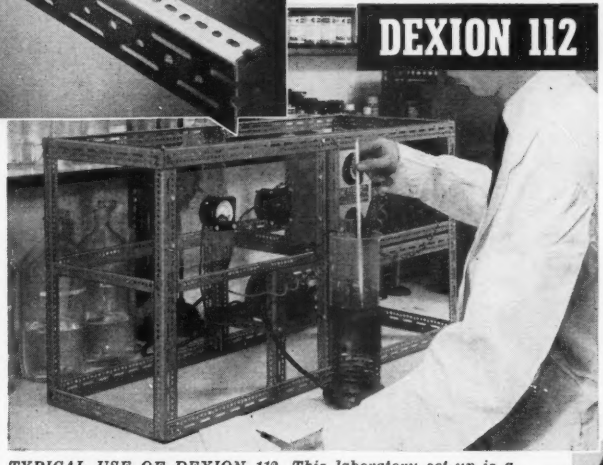
DEXION announces 2 new angles

to round out the world's finest

SLOTTED ANGLE CONSTRUCTION SYSTEM



An instant success upon its introduction in Canada, world-famous Dexion 225 was soon followed by Dexion 300 in response to demand for a heavier section angle. And now, another new chapter in the Dexion success story unfolds with the introduction of two *lighter duty* angles — 112 and 140. With this family of four angles (all designed to be used together) industry now has a range never before offered. Here is the ideal system for solving countless storage and equipment problems — quickly, easily, inexpensively.



TYPICAL USE OF DEXION 112. This laboratory set-up is a good example of how half-size 112 fills the bill to perfection for an application where 225 would be needlessly strong and heavy.

Midget DEXION 112

A half-size version of famous 225, Dexion 112 is the smallest angle in the Dexion system. 112 is ideal for models, display stands and frames, small laboratory and workshop frame-works, etc., and for an even wider range of jobs when used with 140.

112 STEEL and 112 ALUMINUM ALLOY
1⅛" x ¾" x .048"
Both in packages of 100 feet (20 x 5')
with 200 nuts and bolts.

Light Duty DEXION 140

This new angle, smaller than famous Dexion 225, has equal flanges and is designed to bolt together with all the other Dexion angles. It is ideal for many jobs in factory, store, and office where the strength of 225 is not needed, or for lightly stressed members in bigger structures.

140 STEEL 1⅜" x 1⅜" x .070"
140 ALUMINUM ALLOY—1⅜" x 1⅜" x .080"
Both in packages of 100 feet (10 x 10')
with 75 nuts and bolts.

TYPICAL USE OF DEXION 140. Light, strong, rigid and neat looking, this table and the shelves in the background will suggest endless other uses for light duty 140 angle.

Full details, prices & samples from your DEXION distributor

QUEBEC, OTTAWA EASTERN ONTARIO & MARITIMES **Francis HUGHES and Associates Inc.** MONTREAL • OTTAWA	ONTARIO Central, Northern & Western **DEXION (CANADA) LIMITED** WESTON, ONT.
MANITOBA and the LAKEHEAD **KIPP-KELLY LTD.** WINNIPEG, MAN.	BRITISH COLUMBIA **F. T. S. LIMITED** VANCOUVER

ALBERTA & SASKATCHEWAN
NORTHERN ASBESTOS & BUILDING SUPPLIES LTD.
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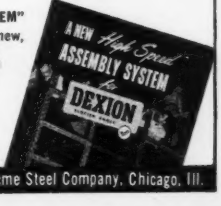
Write for free literature:

"THE DEXION CONSTRUCTION SYSTEM"
The basic DEXION story in words and photographs . . . will suggest many ways to save time, money and labour in your plant.

"CANADIAN DEXION NEWS"
A quarterly publication to keep you right up to date with latest developments and uses.

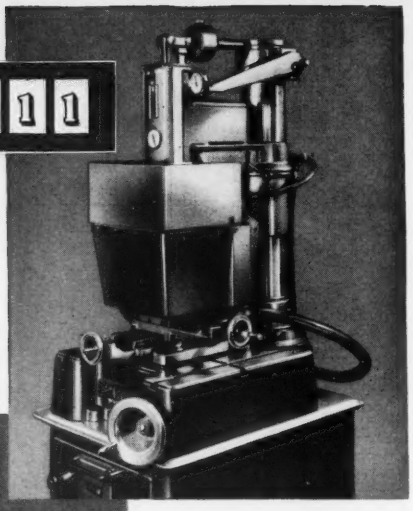
"HIGH SPEED JIG ASSEMBLY SYSTEM"
Describes Dexion's new, simple, inexpensive jig assembly system which doubles and trebles erection speeds, even on jobs using as little as 500 feet.



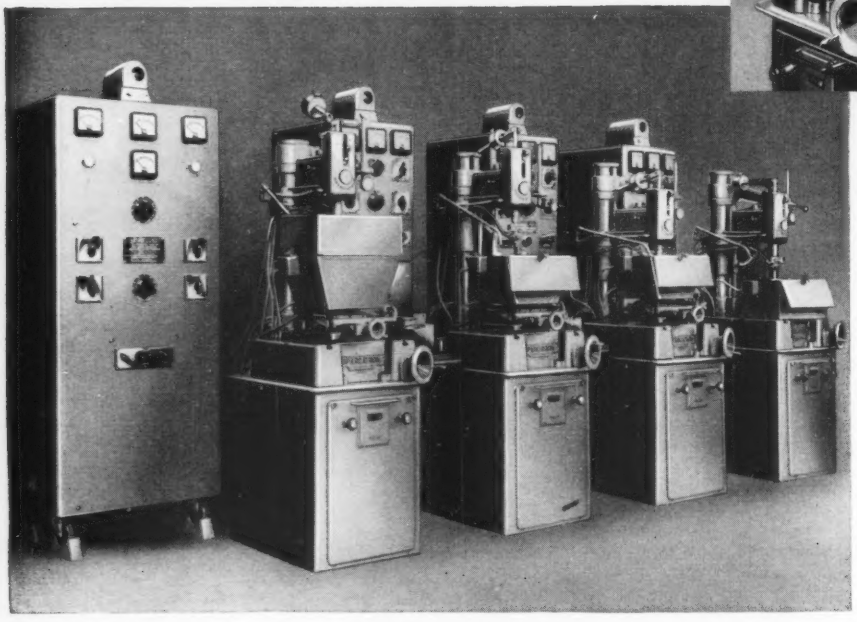
Made in Canada by DEXION (CANADA) LIMITED, 114 CLAYSON ROAD, WESTON, TORONTO 15, ONT. Available in U.S.A : Acme Steel Company, Chicago, Ill.

SPARCATRON Mk. III

6.5kW



The greatest advance since SPARCATRON established spark erosion machining on a commercial basis



Up to four spark-heads can be operated from one control cabinet. The current is automatically cut off when the electrode has penetrated the workpiece to a predetermined depth allowing one operator to supervise a number of heads.

CAPABLE of operating three to eight times as fast as the Mark II model, depending on the type of material and finish required, the latest SPARCATRON spark erosion machine, Mark III, has exceptional accuracy and increased capacity. The new design also features ease of access for loading the table and setting the servo-head and the facility for quick and accurate alignment of the electrode. SPARCATRON affords the best means of "cutting" intricate shapes, profiles, forms, or impressions in both hard and soft current-conducting materials.

SP5

SPARCATRON

Pioneered and established in the toolmaking industry for spark-machining and reconditioning press tools and dies and wire drawing and extrusion dies in cemented carbides and hardened steels. There are extensive applications for "cutting", reconditioning or altering flat and tangential form tools and similar components.

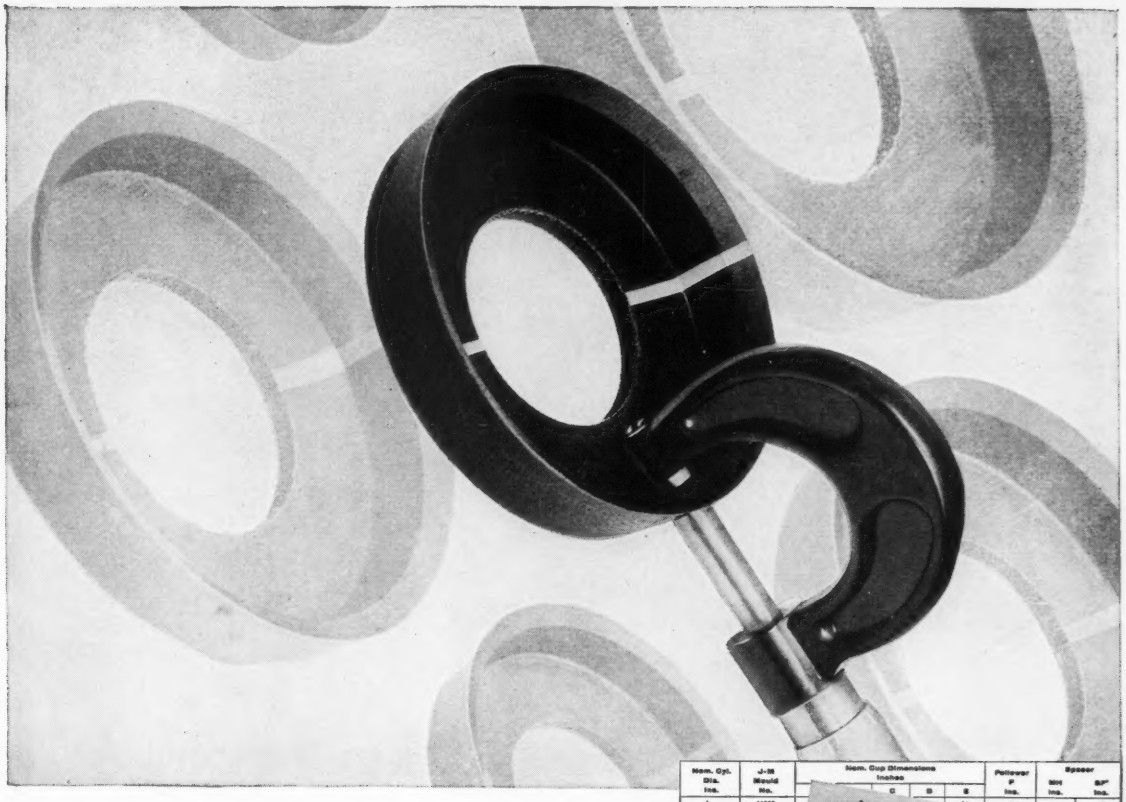
AVAILABLE FOR EARLY DELIVERY

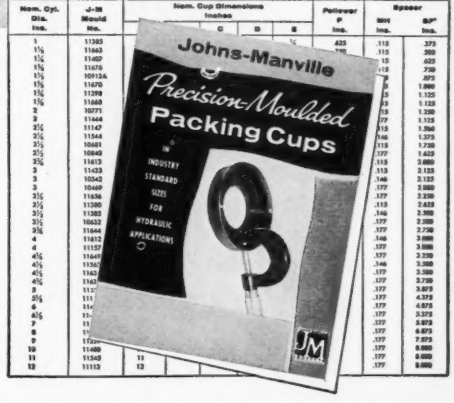
B.S.A. TOOLS LTD.

228 NORSEMAN ST. TORONTO 18

'PHONE BE. 3-1209

Packing Cups in Industry Standard Sizes Precision-moulded by Johns-Manville





Ask for new size list and compound color code of these J-M Packing Cups

Made in the original *square heel* design, developed and perfected by Johns-Manville, these cups are precision made to assure maximum efficiency.

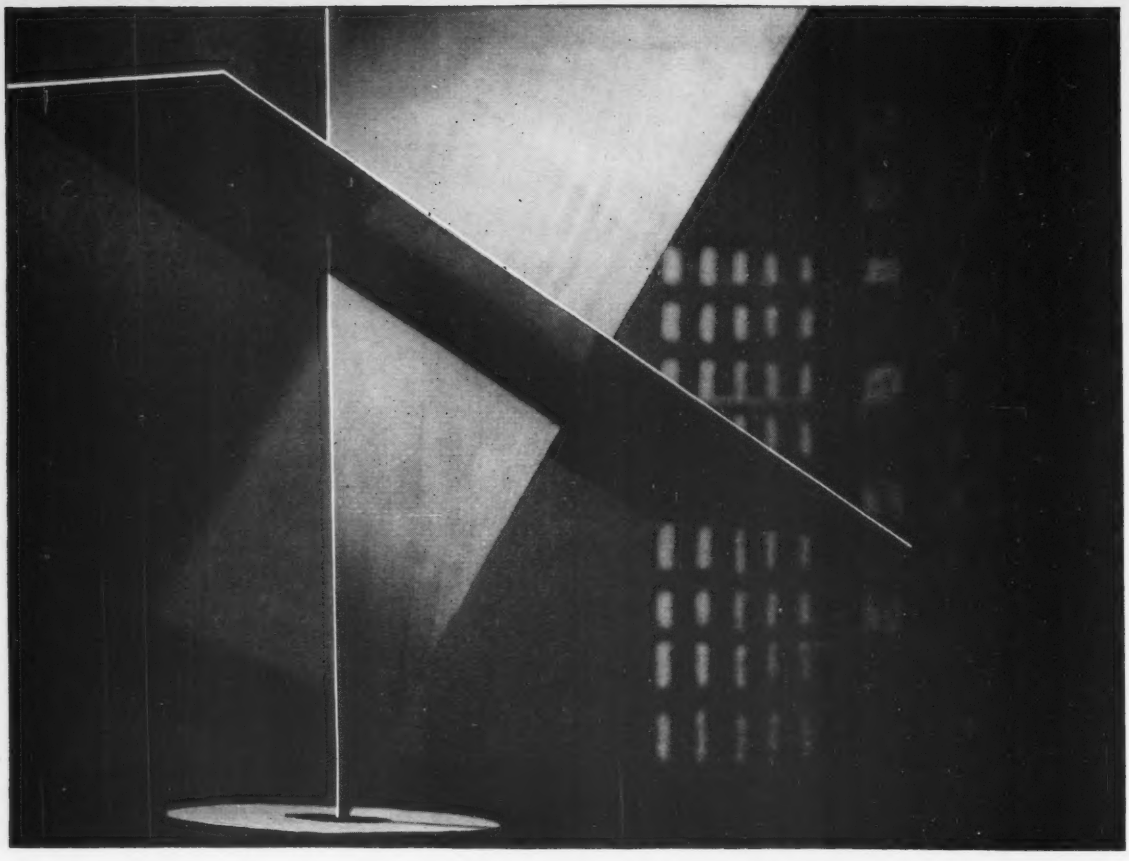
They are available in a variety of styles and compounds to suit most pressures, temperatures and fluids. For easy identification, cups are marked with a different color stripe for each compound.

Complete dimensions, compounds, code and piston design data are in folder PK-107A. Write Canadian Johns-Manville, 565 Lakeshore Road East, Port Credit, Ontario.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville PACKINGS, GASKETS and TEXTILES

I-2133



SYMBOL

This is growth . . . Growth Unlimited!
the picture of the ever-increasing demand for aluminum
in meeting the needs of this modern, rapidly changing age.

Who is responsible for this growth?

Is it the dreamer, the designer, the architect and the engineer who conceive and create new products of aluminum?
Is it the producer of the metal who has invested many fortunes to increase the supply?
Is it the distributor who carries warehouse stocks of aluminum in its many forms . . . in its numerous alloys?
Is it the user who discovers its magic appeal . . . learns new fabrication techniques . . . makes full use of its advantages in weight, strength, corrosion resistance and cost?

It's all of this . . . *and plenty more!*

Are you taking full advantage of aluminum?

Are you familiar with all the latest in fabrication techniques? Are you aware of its potentialities?

It's up to us to put you in the aluminum picture with complete information, personal assistance, and to supply the metal you need — *when you need it!*

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STAINLESS ALLOYS AND ALUMINUM IN ALL COMMERCIAL MILL FORMS

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92 MONTÉE DE LIESSE, VILLE ST. LAURENT, MONTRÉAL, P.Q.
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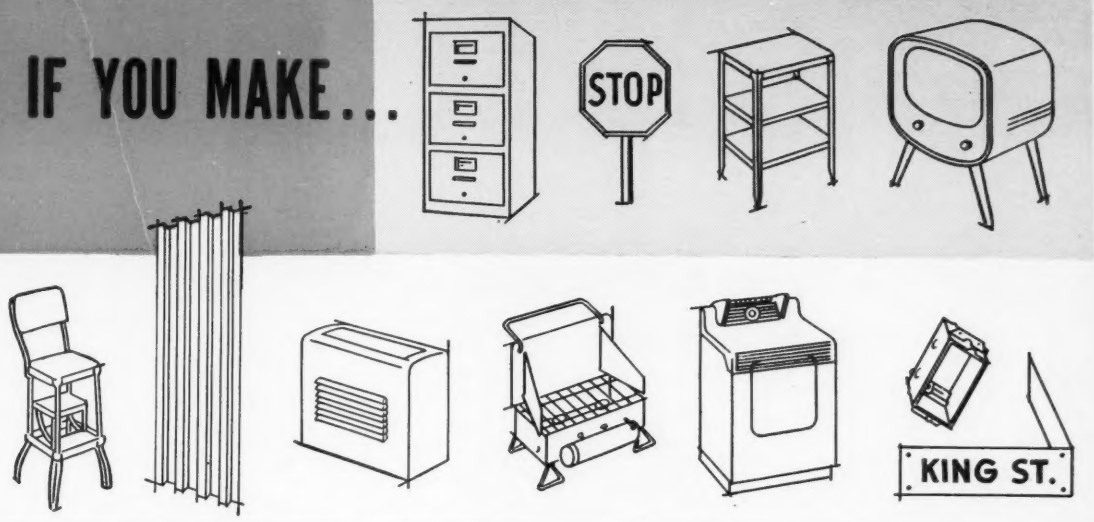
THERE IS NO PLACE FOR CORROSION IN YOUR BUSINESS

IF YOU MAKE...



YOU'LL MAKE THEM BETTER WITH... satincoat

Better products at lower cost . . . that's the promise new SATINCOAT holds for Canadian manufacturers! Dofasco's latest zinc-coated steel takes decorative paints, enamels, inks without pre-treatment. And it **holds** a fine finish during the entire life of the product. The secret is in Dofasco's "continuous" galvanizing process where a ductile zinc coating is bonded so tightly to steel that it actually flexes with the base metal. Moisture cannot penetrate. Paint-lifting rust and corrosion have no place to get started! If you're looking for ways to cut manufacturing costs without sacrificing quality . . . look to SATINCOAT . . . Canada's newest fabricating steel! Samples and full details on request.

DOMINION FOUNDRIES AND STEEL, LIMITED
HAMILTON ONTARIO CANADA

A NEW STEEL PRODUCT BY

Dofasco

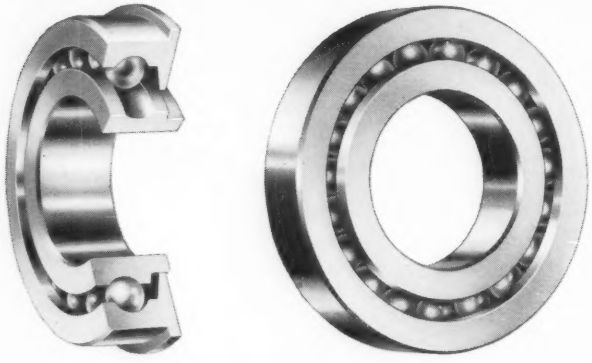
23-5210R

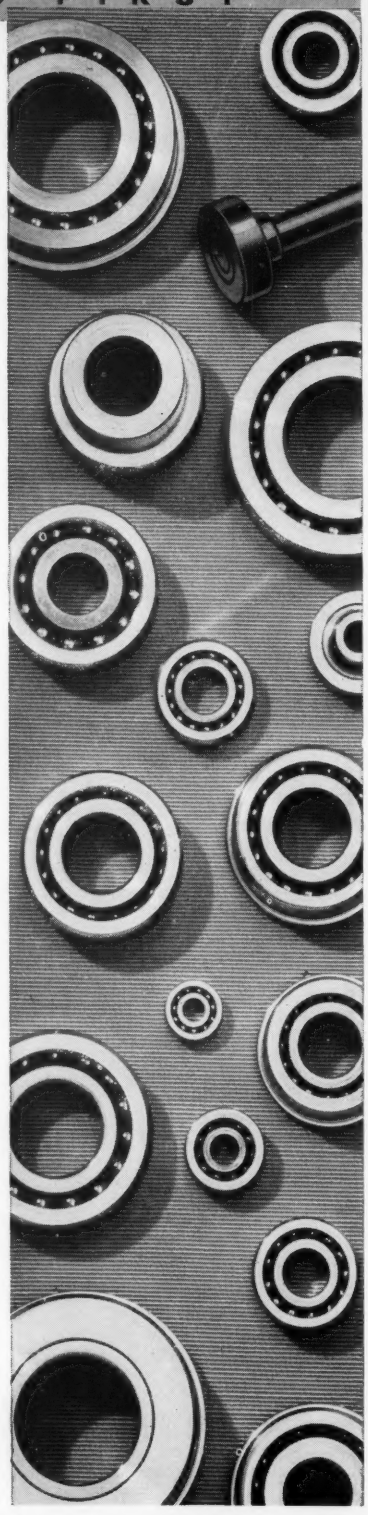
BEATS HIGH COST OF IMPORTED ELECTRO-GALVANIZED STEEL

ANOTHER HEIM *Unibal* FIRST

HEIM INTRODUCES THE NEWEST IDEA IN BALL BEARINGS

without insertion grooves or inserts





A most unusual, NEW concept in ball bearing design . . .

Here is a commercial ball bearing with solid, unbroken machined inner and outer raceways, yet with a full complement of balls.

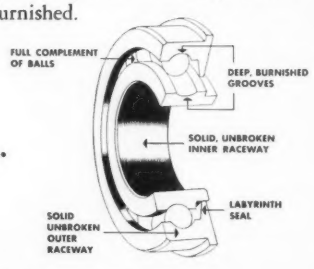
It has deep, burnished ball grooves that are deep carburized and hardened. The revolutionary and radically new method of manufacture permits assembly of these ball bearings in a way that borders on the mysterious and challenges the imagination.

Radial and axial load capacities are increased because of the raceway construction, resulting in longer bearing life.

Unibal Ball Bearings can be furnished in single row, double row and flanged types; to close tolerances on bore and outside diameter; and with controlled radial and axial play.

Close, integral labyrinth seals on one or both sides are another unusual feature, where sealed type bearings are required. Extremely narrow widths and small diameters can be furnished.

NOTE THIS CONSTRUCTION . . .



Special circular with load ratings and dimensions on the new Unibal Ball Bearings is available.

HEIM also makes the Unibal Spherical Bearing Rod End. Send for complete catalog of all Heim bearings. Write direct or see your local bearing distributor.

R&M BEARINGS CANADA LTD.

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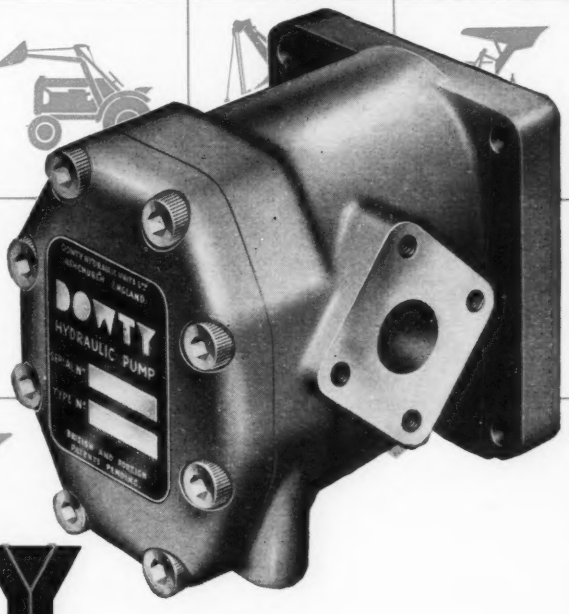

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★1 to 50 G.P.M.★HIGH PERFORMANCE★SIMPLE CONSTRUCTION

A complete engineering department is at your disposal to help solve difficult product problems. Dowty 'know-how' gives you extra quality, prompt service. Their design suggestions can mean efficient production methods — and lower costs to you!

Why not write or 'phone us today.

Pumps • Control Valves • Rams • Couplings

DOWTY EQUIPMENT OF CANADA LIMITED • AJAX • ONTARIO

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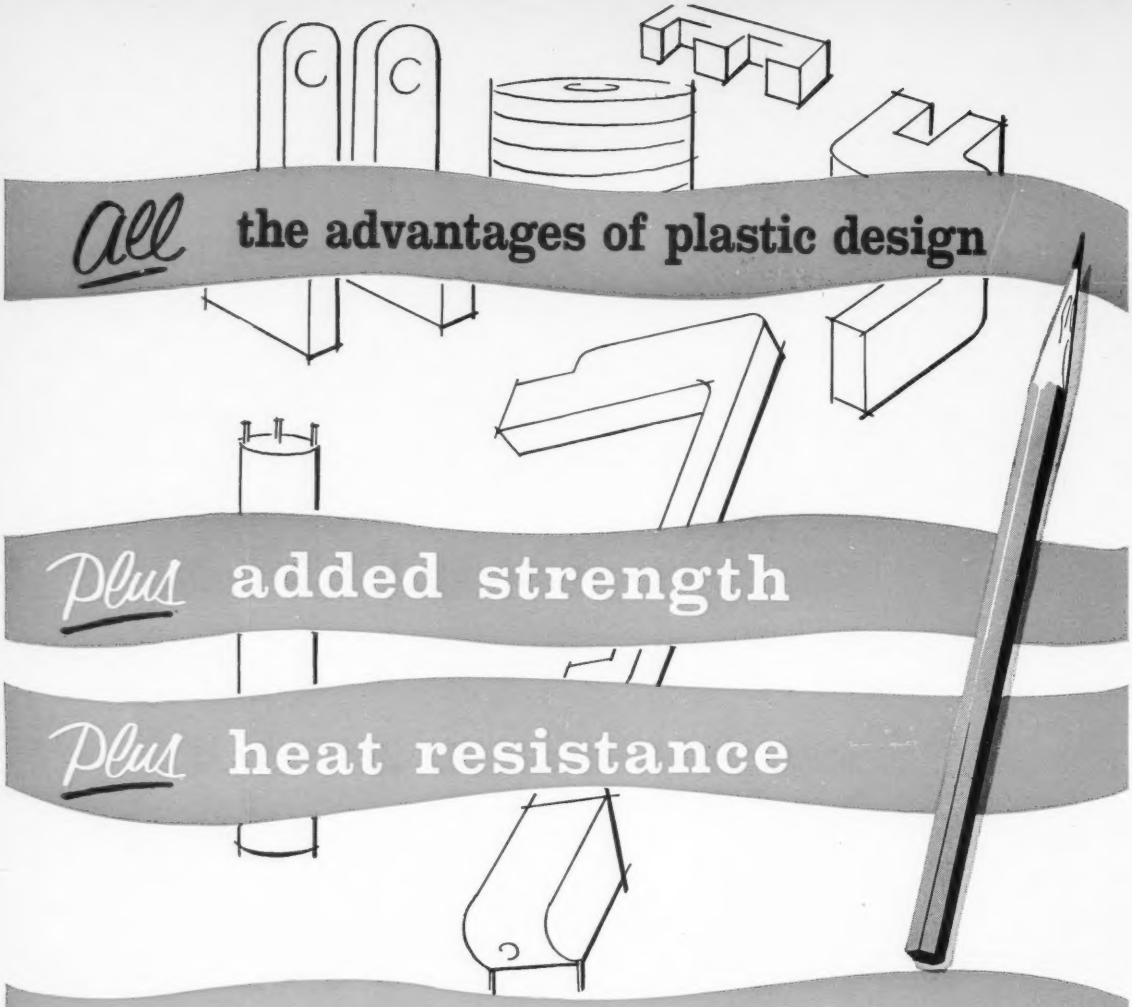

All the advantages of plastic design

Plus added strength

Plus heat resistance

Equals FIBERGLAS* reinforced *plastics*

When plans are in the fluid stage . . . that's the time to consider what reinforced plastics can offer. Most plastics are out-classed when it comes to the questions of strength and heat resistance. But Fiberglas reinforced plastics are incredibly tough and show an excellent heat resistance. They have colour and lightness. You can mould them to suit the most intricate shape. They resist abrasion and withstand weathering.

*T.M. Reg'd.

IT'S AMAZING THE DIFFERENCE FIBERGLAS MAKES

FIBERGLAS*
FIBERGLAS CANADA LIMITED

FURTHERMORE
These familiar plastic items were made possible by *Fiberglas Reinforced Plastics*

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GENERAL SALES OFFICES:
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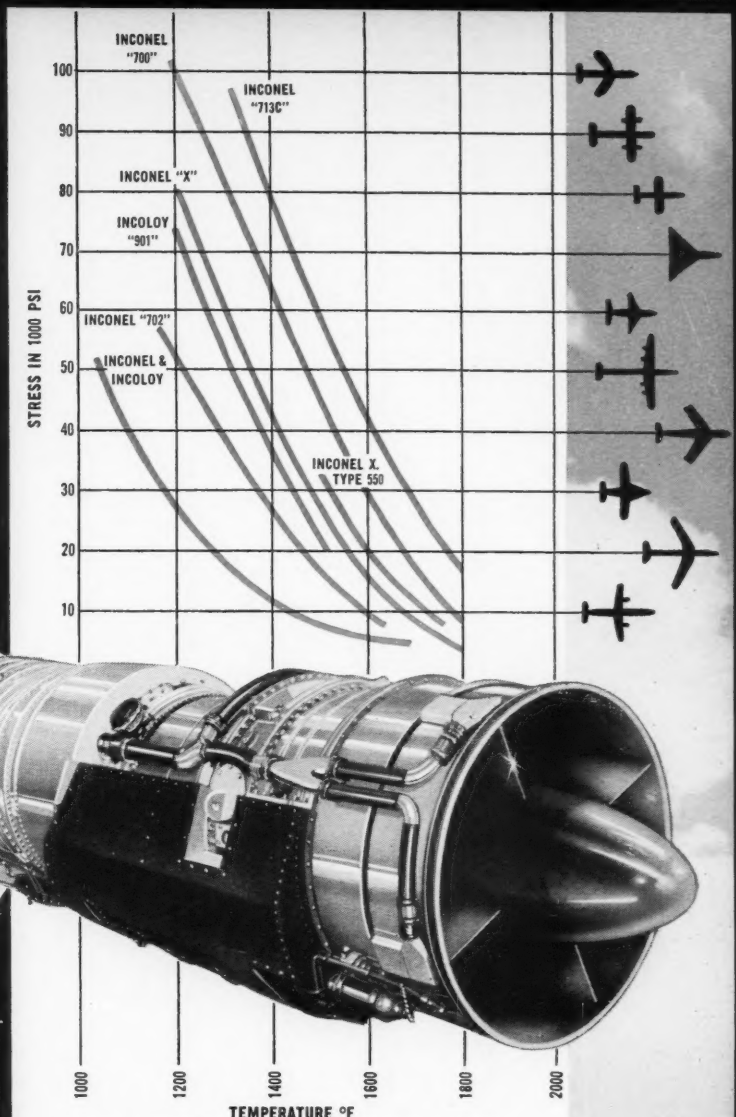
new Inco alloys

give excellent performance in high stress, high temperature aeronautical applications



100 HR CREEP RUPTURE STRENGTH OF SOME INCO ALLOYS

Aircraft engineers will recognize this gas turbine engine... the new Orenda "Iroquois". Some of the Inco alloys employed in the "Iroquois" are depicted on the graph above. This graph shows maximum temperatures which these and other Inco alloys will withstand for 100-hour life at various stresses.

Naturally, the selection of materials for high temperature applications involves many other factors not illustrated in this graph. Where stress is low, for example, higher temperatures may be permissible. Much of this technical information has already been accumulated by Inco.

New wrought alloys such as *Inconel 700 and *Incoloy 901, developed by Inco, are available for high temperature service. A precision casting alloy—*Inconel 713C—has recently been added to the group. Alloys that resist oxidation at temperatures up to and beyond 2000°F. have been perfected.

Modern high speed flight has cleared the sound barrier and is penetrating the thermal thicket. Advanced turbo-jets, rockets and ramjets are producing unbelievable levels of power. As power and speed increase, temperatures become more critical. Inco's research and production facilities are dedicated to the task of keeping abreast of these developments.

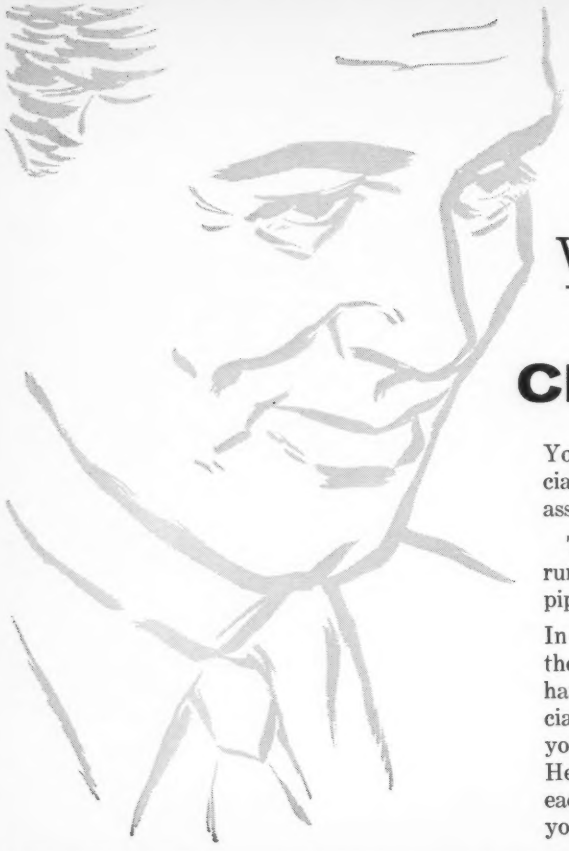
For information concerning special Inco alloys for high temperature applications, write today.

*Trade Marks

INCO
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED

25 KING STREET WEST, TORONTO



headers without headaches!

FABRICATED IN THE CRANE Pipe Shop

You're spared many a headache when Crane specialists take over the job of putting together piping assemblies like this header.

They save you time and trouble — and in the long run, money — as they build precisely, to applicable piping codes, and to your drawings and specifications.

In the modern Crane Shop are the tools and machines, the handling facilities and the specialized knowledge to make sure you get exactly what you want. Here, too, is the equipment to test each piece BEFORE it reaches you for final installation.

THE ENTIRE JOB IS DONE BY CRANE

Threading • Welding
Bending • Flanging
Lapping • Swedging
Heat treating
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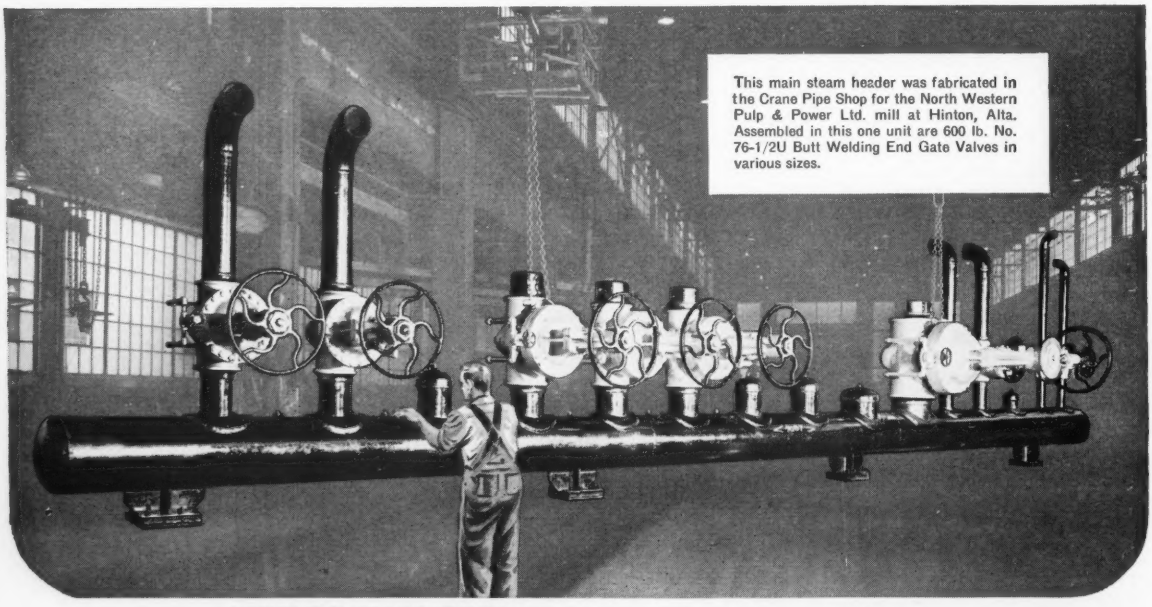
Hydrostatic testing inspection.



This main steam header was fabricated in the Crane Pipe Shop for the North Western Pulp & Power Ltd. mill at Hinton, Alta. Assembled in this one unit are 600 lb. No. 76-1/2U Butt Welding End Gate Valves in various sizes.

COMPLETE CRANE SERVICE assures you of the highest standards of materials and workmanship. Contact your local Crane Branch or Valve and Fitting Department, General Office.

CRANE LIMITED: General Office, 1170 Beaver Hall Square, Montreal — 7 Canadian Factories • 32 Canadian Branches

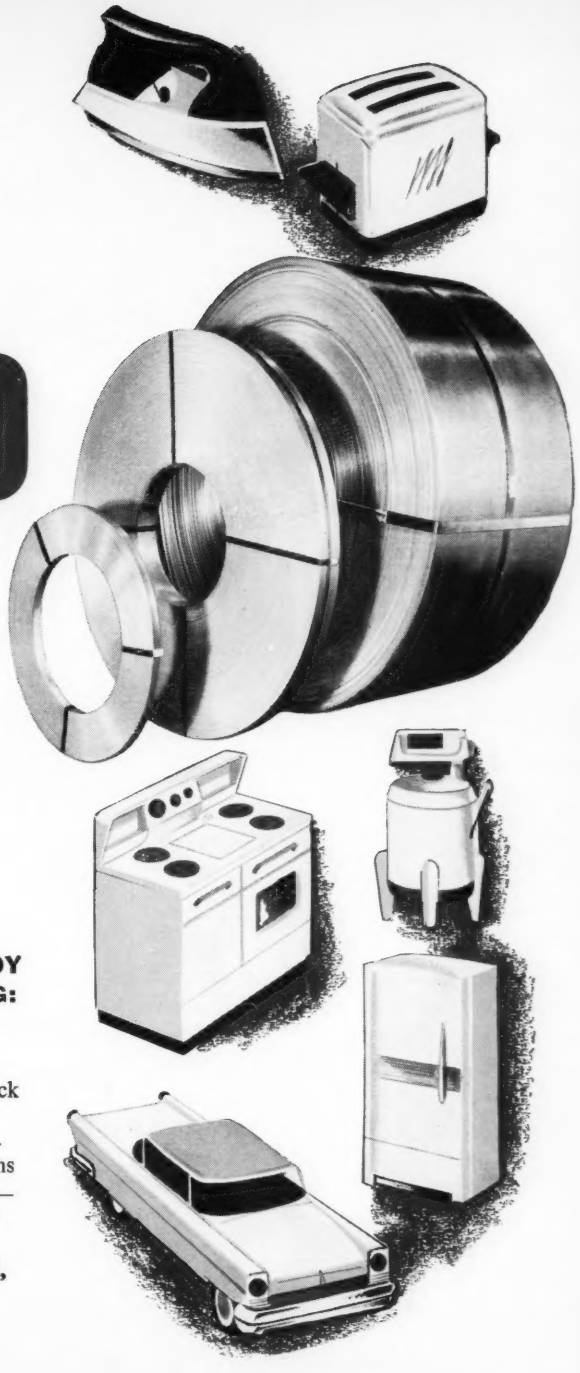
CRANE

VALVES • FITTINGS • PIPING
PLUMBING • HEATING

For an iron or an automobile—
for an oil line pipe or a ship

FLAT ROLLED STEEL

must be of suitable specification
properly processed for each
individual manufacturing requirement.



ALGOMA STEEL CORPORATION PRODUCES HIGH QUALITY FLAT ROLLED STEEL IN CARBON AND ALLOY GRADES, INCLUDING THE FOLLOWING:

- Hot Rolled Universal Mill Plate
- Hot Rolled Pipe Skelp—mill or bevel edge—black or pickled and oiled—in coils or cut lengths
- Hot Rolled Sheets and Strip—mill or slit edge—black or pickled and oiled—in coils or cut lengths
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Sault Ste. Marie, Ontario

DISTRICT SALES OFFICES: MONTREAL · TORONTO · WINDSOR · HAMILTON · WINNIPEG

Biggest Silicone Rubber Roll made possible by unique compound

What! Silicone rubber in thick sections? It couldn't be done! But today *it is done* with a new UNION CARBIDE Silicone Rubber Compound. Witness the product in the accompanying picture—a silicone rubber roll 55 inches long by 8 inches in diameter—believed the largest ever built.

Most astonishing of all: The costly, step-by-step curing cycles, once necessary to prevent blowing and delaminating, give way to a one-step cure.

You might find a use for such a roll in a paper mill, or in textile machinery, where non-sticking qualities are important. You might find other uses for UNION CARBIDE Silicone Rubber and Compounds for products that must remain flexible at very low temperatures, resist high heat, provide extremely low compression set, or offer resistance to ozone, corrosive atmospheres, or electricity.

Besides silicone rubbers, UNION CARBIDE is a leading producer of silicone electrical insulation resins, of silicone release agents, and silicones for water repellents. The combined experience of UNION CARBIDE and its various Divisions can assist you in their application. Call us in, today.

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Trade Mark
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Please send me data on Silicones for:

☐ Rubber Rolls ☐ Class H Electrical Insulation
☐ Release Agents ☐ Rubber Gum Stock and Compounds

Name ..... *Title* .....
Company .....
Address .....
City ..... *Zone* ..... *Prov.* .....

BEFORE YOU SAY

"IT CAN'T BE CAST"

Transmission Shifter Fork

Automatic Winch
Brake Pawl Carrier

CALL AN ESCO ENGINEER

ESCO alloy steel castings can make your designing *easier*. You get the part you want, in the alloy you need and in the shape that saves you the most fabricating, machining and finishing time.

PLUS METALLURGICAL ENGINEERING AND RESEARCH
ESCO maintains one of the largest and best equipped metallurgical staffs of any alloy steel foundry—

PLUS PRODUCT ENGINEERING AND DESIGN
An integrated service at all levels; in the field, at the drawing board and in the foundry—

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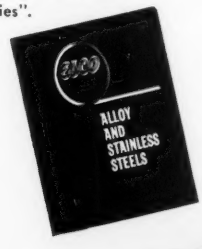
A casting service that covers the complete range of alloy steel casting methods of all applications—

PLUS LABORATORY INSPECTION AND TESTING
ESCO laboratory technicians are qualified and equipped to perform all types of inspections and testing to the most rigid specifications.

Call an *ESCO* Engineer — let him show you how *ESCO* Alloy Steel Castings make your designing easier.

Write for FREE copy of 100-page reference book, "*ESCO* Alloy and Stainless Steels for the Process and Manufacturing Industries".



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AIR AND HYDRAULIC

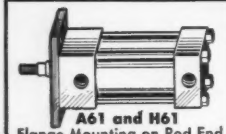
"STANDARDIZED" CYLINDERS

"IN STOCK" for immediate delivery...

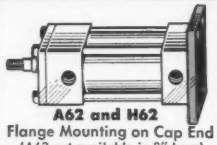
See Miller Bulletins A-105 (Air) and H-104 (Hydraulic) for Complete Dimensions and Engineering Data on these standardized "in stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 ft.

"IN-STOCK" MODELS

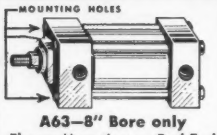
"A" Signifies Miller 200 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Red On Drawings.



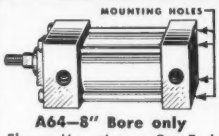
A61 and H61
Flange Mounting on Rod End
(A61 not available in 8" bore)



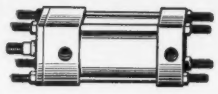
A62 and H62
Flange Mounting on Cap End
(A62 not available in 8" bore)



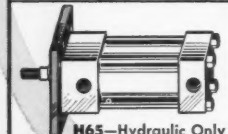
A63—8" Bore only
Flange Mounting on Rod End



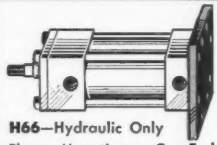
A64—8" Bore only
Flange Mounting on Cap End



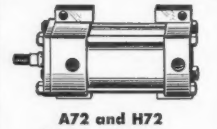
A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended. Cap End only.
A53 & H53—Tie Rods Extended. Rod End only.
A54 & H54—Two Tie Rods extended at both ends.



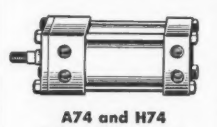
H65—Hydraulic Only
Flange Mounting on Rod End



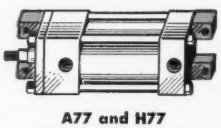
H66—Hydraulic Only
Flange Mounting on Cap End



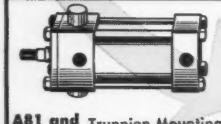
A72 and H72
Side Lug Mounting



A74 and H74
Side Flush Mounting

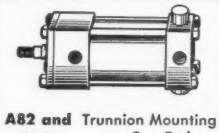


A77 and H77
Side or Foot Mounting

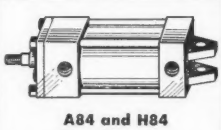


A81 and H81 Trunnion Mounting on Rod End

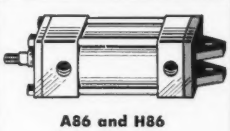
Your Choice of
CAP END CUSHIONED
ROD END CUSHIONED
or
BOTH ENDS CUSHIONED
on all cushioned strokes of all bores shown.



A82 and H82 Trunnion Mounting on Cap End



A84 and H84
Pivot Mounting



A86 and H86
Pivot Mounting

IN STOCK BORES in Inches

	BORES	ROD DIA.	ROD TURN DOWN & THREADS	"IN-STOCK" STROKES (in Inches)
AIR	1½	⅝"	7/16-20	Cushioned: 3 4 5 6 7 8 9 10 11 12
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12
	2	⅝"	7/16-20	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	⅝"	7/16-20	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1"	¾-16	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1"	¾-16	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	1"	¾-16	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	6	1⅜"	1-14	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	8	1⅜"	1-14	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
HYDRAULIC	1½	⅝"	7/16-20	Cushioned: 3 4 5 6 7 8 9 10 11 12
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12
	2	1"	¾-16	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	1"	¾-16	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1⅜"	1-14	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1¾"	1¼-12	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	2"	1½-12	Cushioned: 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.: 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36

① "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

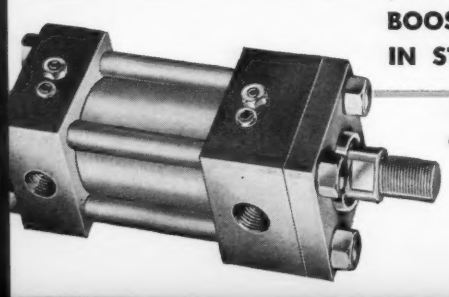
Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.



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Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBA8, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.

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Flick-Reedy Corp

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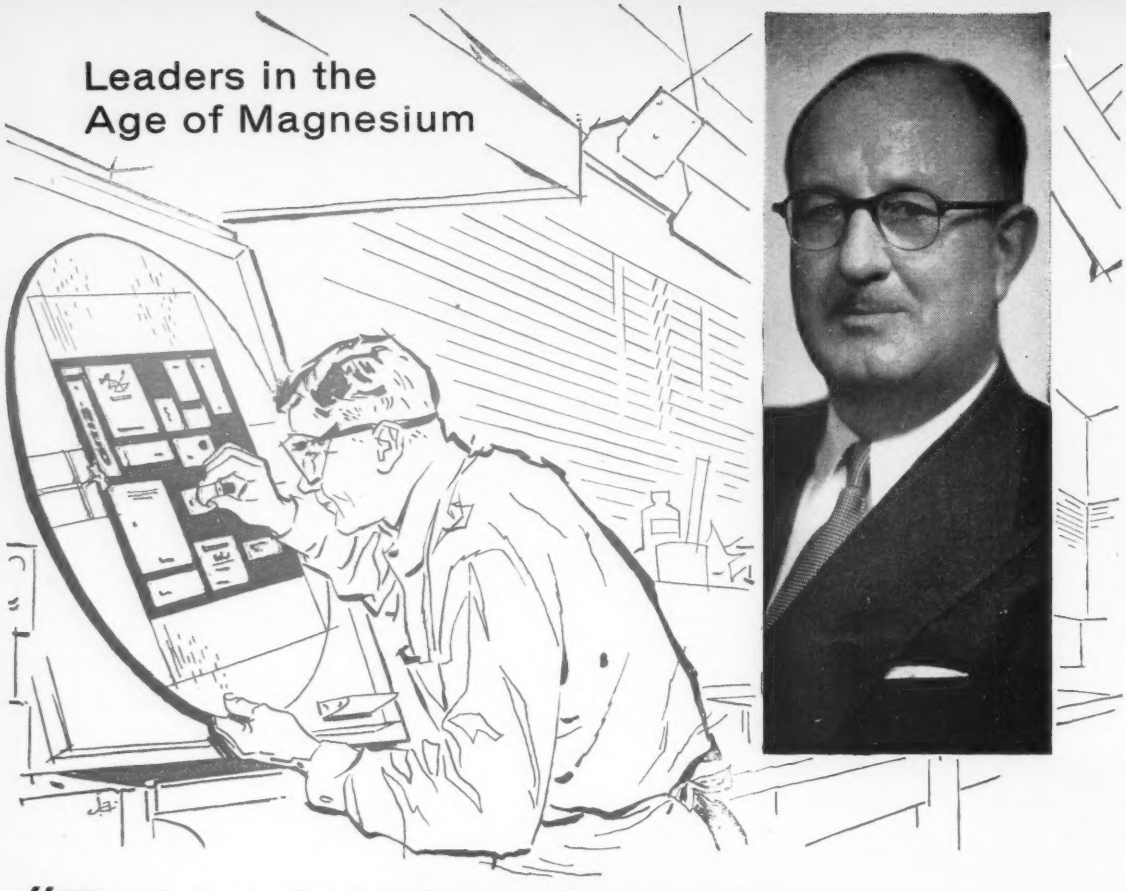

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Extract from a letter by Mr. Howard Perkins, President, Brooks and Perkins Inc., Detroit, Michigan.

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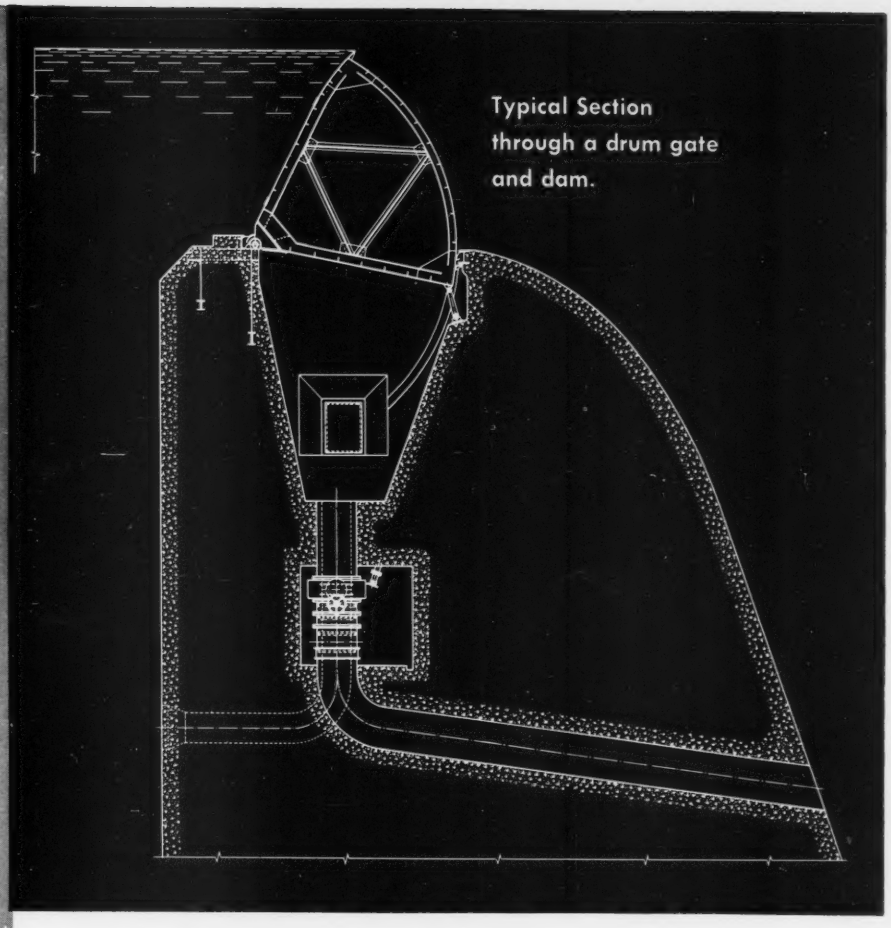

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SLUICE GATES

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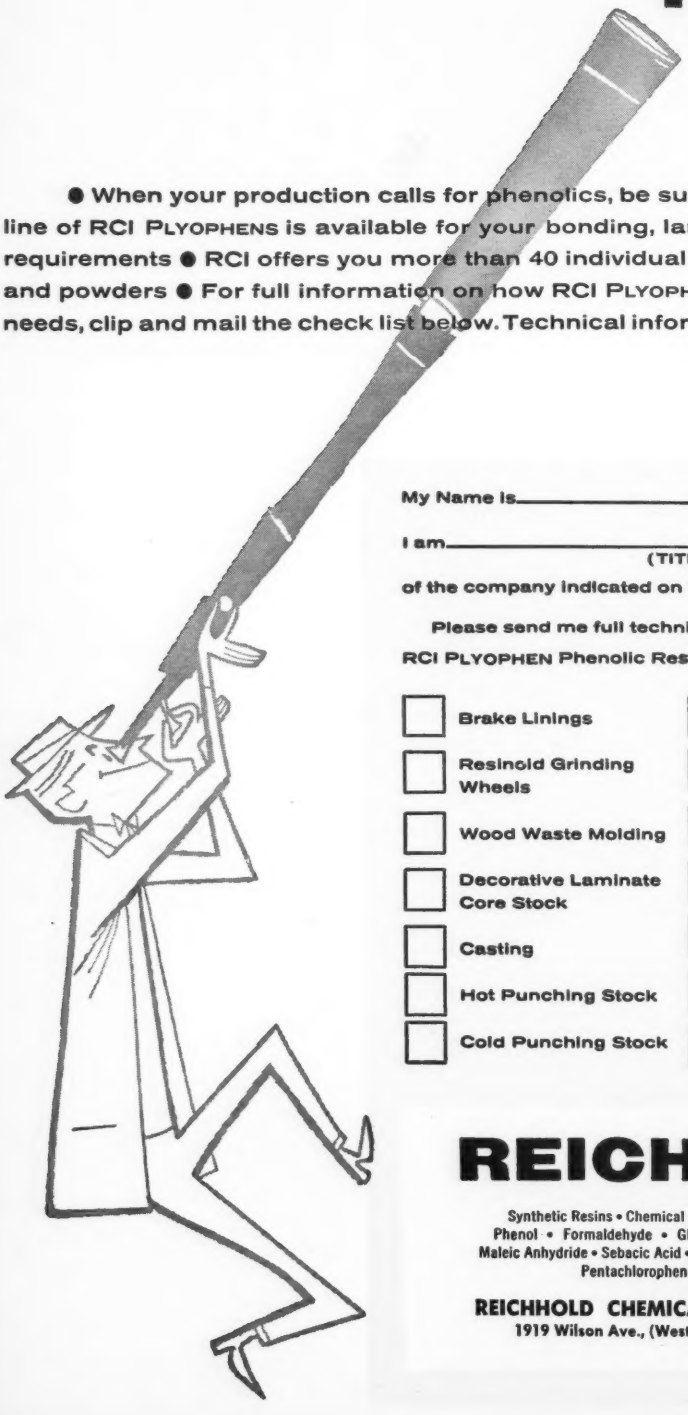

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- ☐ Cold Punching Stock
- ☐ Gear Stock
- ☐ Rolled Tubing
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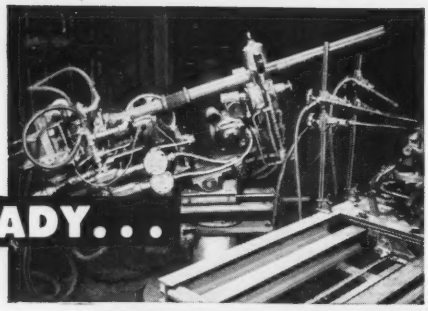
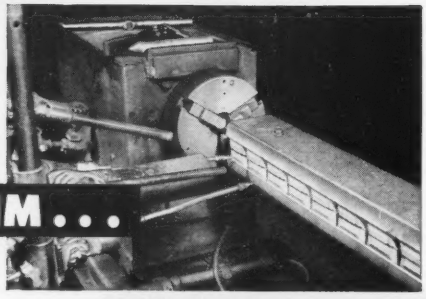
LINDE's Flame-Plating gun is operated entirely by remote control. At control panel (below) is operator, who observes process through safety-glass window. At right, Flame-Plating gun is seen as workpiece is secured in fixture (top), as gun is brought into range (center), and at the instant of a blast in the plating action (bottom).





Not all guns shoot BULLETS ...this one gives metal parts EXTRA WEAR RESISTANCE

A dramatic and useful coating process for metal parts has been developed by LINDE engineers to provide extra resistance to wear and abrasion. This method, called Flame-Plating, utilizes a special, rapid-fire gun to apply an extremely hard coating of tungsten carbide or aluminum oxide on precision parts subject to unusual wear or fretting corrosion.

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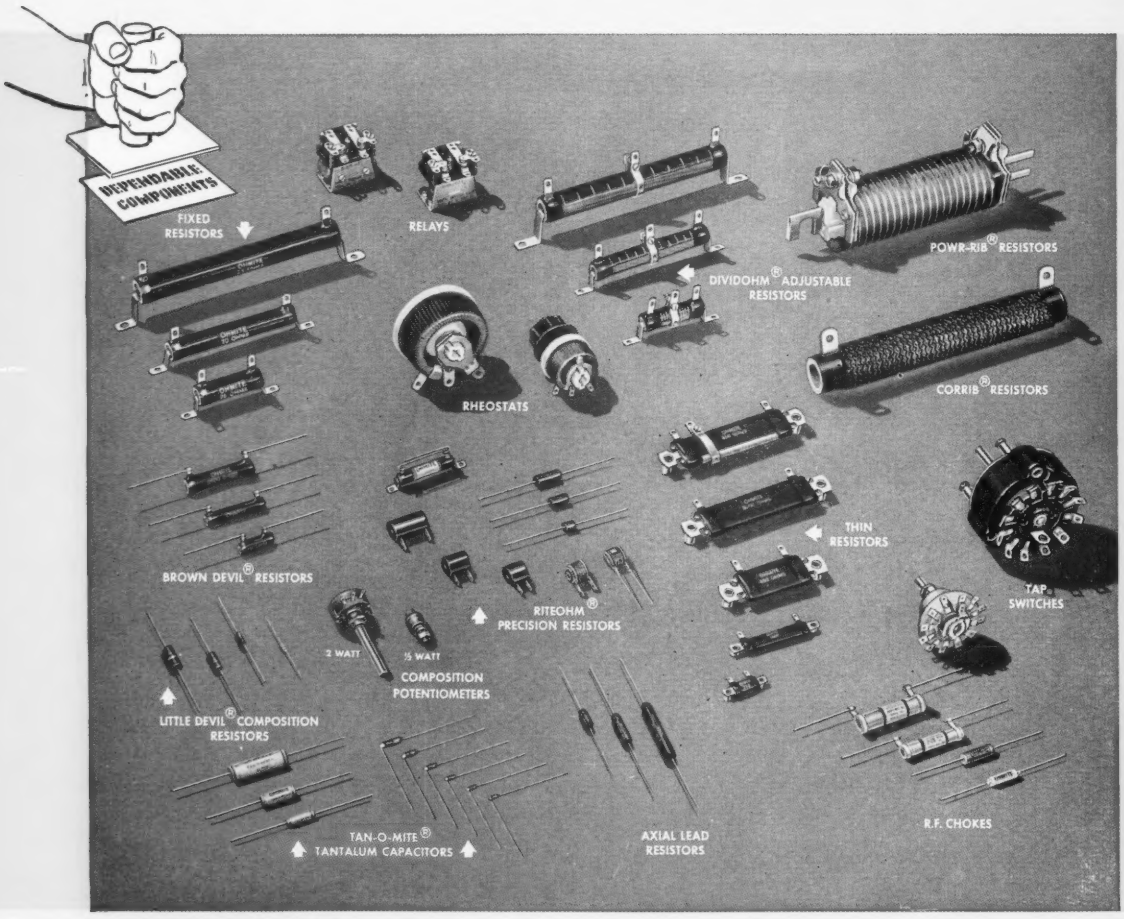

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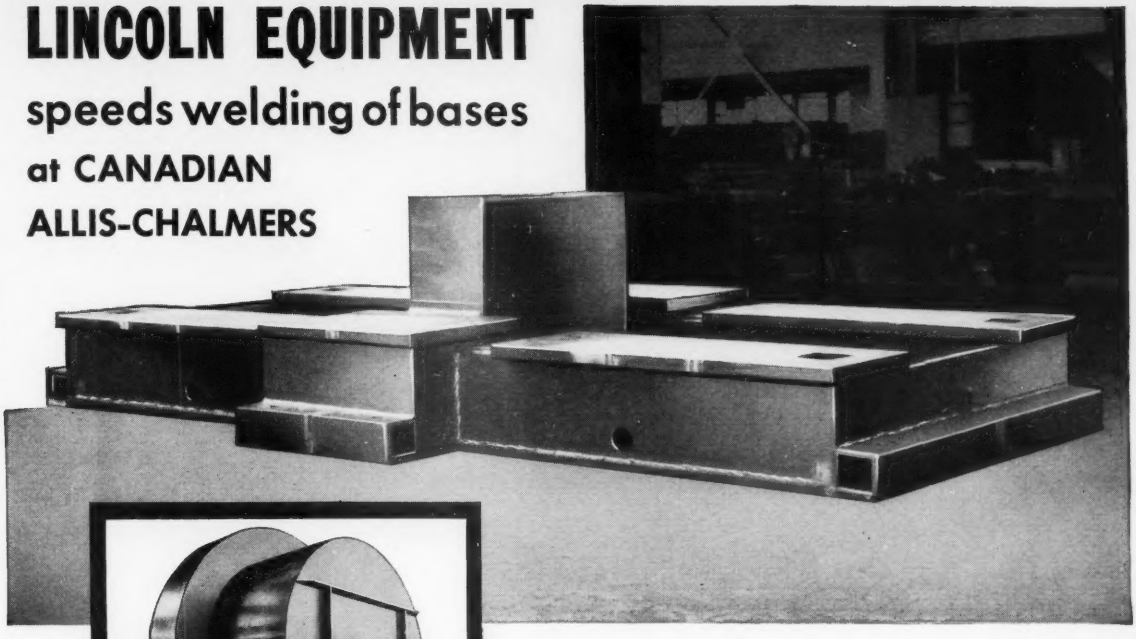

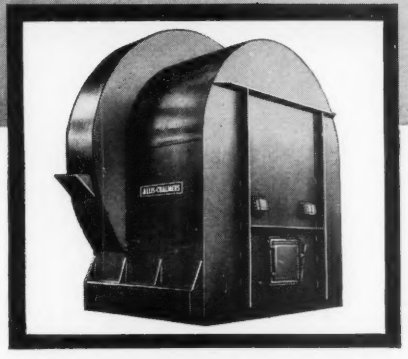

At Canadian Allis-Chalmers Ltd., Lachine, Que., where welded-construction is standard practice for bases, frames, hoods and other structural elements of heavy industrial machinery, **Lincoln** welders and electrodes are cutting costs and improving weld quality.

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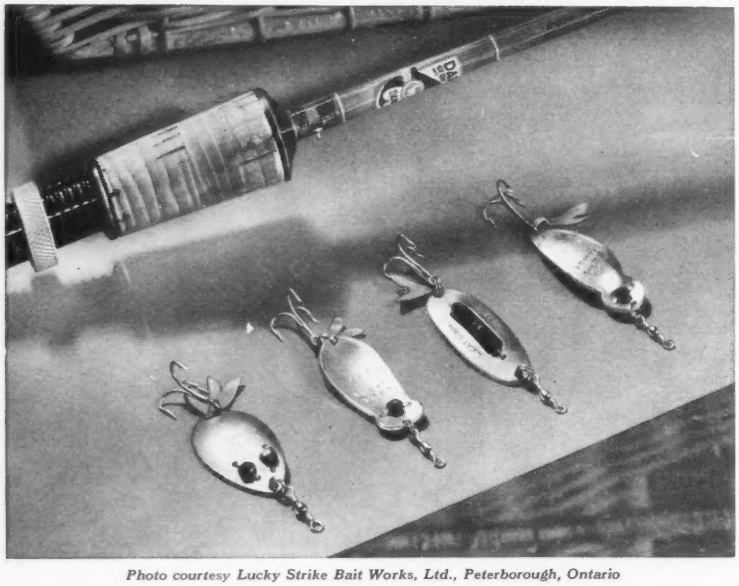


Photo courtesy Lucky Strike Bait Works, Ltd., Peterborough, Ontario

Noranda Ultra Fine Grain Brass Used Exclusively in Fishing Lures

To the average fisherman, lures plated with chrome, brass or gold look very much alike on the surface. Appearance counts—especially when there's an elusive bass to be hooked—but a lot also depends on the material *underneath* the plating.

To help build sturdy performance into their casting, spinning and trolling lures, Lucky Strike Bait Works Ltd. of Peterborough, Ont. uses Noranda F-69 Ultra Fine Grain Yellow Brass, and regular Yellow Brass strip in various other tempers. This is the story of *how* and *why* Ultra Fine Grain Brass is used exclusively in the manufacture of these excellent lures.

Manufacturing Requirements Studied

Lucky Strike Bait Works gave Noranda full operational details, and asked us to recommend the materials that would do the job best.

Our laboratory's study showed that *close dimensional tolerances* are required, because the metal is run on high-speed presses using multi-stage dies. *Corrosion resistance,* of course, is highly important in a fishing lure. *Ease of plating* is a "must," since the complete bait (hook, spoon, ring and swivel) is plated for colour-matched appearance. *Edges* must be exceptionally good, because lures are often formed from strip, using the edges as supplied by Noranda. *Temper* has to be correct, especially in material that must withstand severe forming operations.

Material Problems Considered

Other factors, too, had to be considered. Metal had to have high breaking strength and withstand stretching in the forming operation. Metal costs had to be kept to a minimum, production economies realized, if possible, and the intrinsic advantages of copper-base alloys retained. Of prime importance was grain size, which affects tensile strength, per cent elongation, Rockwell hardness and ductility. The smaller the grain size, the higher the tensile strength and the greater the hardness. Microstructures of extremely fine grain size are designated as Ultra Fine Grain.

Ultra Fine Grain Brass approaches normal brass, quarter hard temper (reduced 1 number B&S) in most physical properties. Its ductility is somewhat higher than quarter hard temper, making it a very satisfactory material for items made by forming and stamping.

Savings Realized—Ultra Fine Grain Brass Recommended

Because it best met all finished product and manufacturing requirements, Noranda suggested the use of Ultra Fine Grain Brass, which soon proved its superiority. The fine grain structure gave strength to withstand forming operations without breaking. No appreciable stretching occurred, and so no rough surfaces resulted. Lucky Strike Bait Works has consequently been able to realize real savings in finishing costs, since a minimum of polishing brings up a high lustre.

Ultra Fine Grain Used Exclusively

Lucky Strike Bait Works, Ltd. now uses Noranda Ultra Fine Grain Brass exclusively for casting, spinning and trolling lures because:

1. It has proved to be the best metal for the application.
2. It has lowered finishing costs as well as first costs.
3. Temper is always correct for forming operations.
4. Dimensional tolerances can be closely held for blanking operations.

Ask for Recommendation

Noranda Ultra Fine Grain Brass has solved similar problems for many other companies. Perhaps it can simplify your new application, or provide a better, economical solution to your stamping or forming operations.

However Fine Grain brasses can not be used indiscriminately. Noranda will be glad to recommend the *best material* to do the *best job* for you.

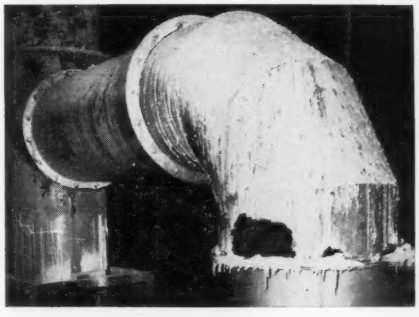
For greater economies in finishing operations, through using brass or copper matched to your needs, contact your nearest Noranda Sales Office. (879)

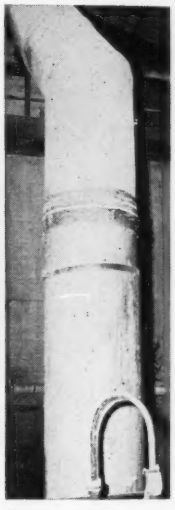
CYANAMID

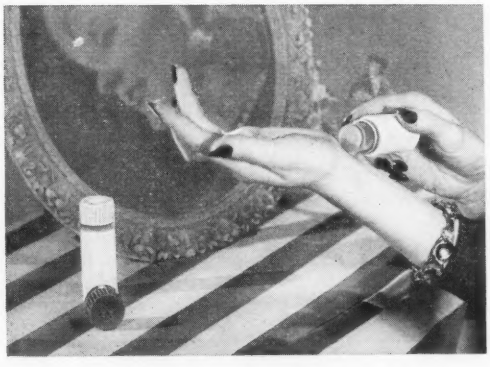
PLASTICS NEWSFRONT

THREE YEARS IN CORROSIVE SERVICE WITHOUT MAINTENANCE

That's the record established by reinforced LAMINAC® polyester resin in venting service on alum digesters at Cyanamid's Warners plant. The carbon steel breech (left) in an alum evaporator required frequent maintenance, failed after less than three year's service. Glass-reinforced LAMINAC stacks (right) in even more severe alum digester service, have needed no maintenance in more than three years. The LAMINAC units cost less in the long run, and were easier to erect and assemble, using either telescope joints wrapped and polyester-welded on the site, or flange-type joints.





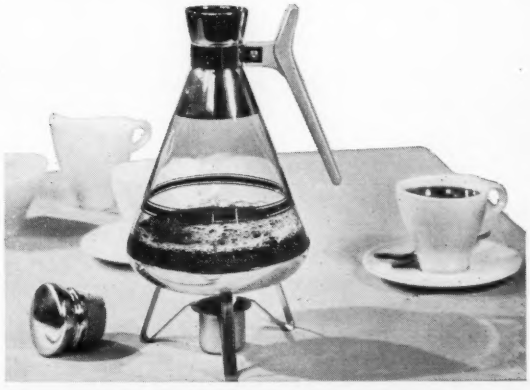


ATTRACTIVE, AIRTIGHT CASE FOR STICK COLOGNE

Six new scents of Avon Stick Cologne are packaged in smartly styled, practical cases molded of BEETLE® urea molding compound. Cases have a white base with contrasting closures in a different color for each scent. Airtight, the BEETLE case stops evaporation of the cologne. Yet the closure opens easily, and with a twist of the wrist the stick pops up for use. The case resists alcohol, essential oils and chemicals as well as staining from perspiration and grime, which wipe off easily.

FUNCTIONAL HANDLES GRACE CARAFES

Any dining or buffet table would be graced by this attractive carafe with its stylish, beige-colored handle molded of CYMEL* melamine molding compound. Elegance and function are combined in the handle, balanced for easy, comfortable pouring. Harmonizing with the carafe's gold decoration, the molded-in color won't chip or wear off. In keeping with its function, CYMEL is exceptionally strong, resistant to heat and flame, and stays cool even when the carafe, made by Club Aluminum Products Company, is full of hot coffee. *Trademark



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NORTH AMERICAN CYANAMID LIMITED
PLASTICS AND RESINS DIVISION
160 BLOOR STREET EAST, TORONTO 5, ONTARIO

CYANAMID Plastics and Resins Division
MATERIALS FOR TOMORROW

LINE OF LEAST RESISTANCE

Torrington now offers to manufacturers in the air conditioning, heating and ventilating industry the most complete line of air moving units in the world... and in the three basic areas of air impeller development: fans, airotors and complete blower units. Backed by the industry's finest research and development facilities, Torrington engineers work *only* on air moving problems and products. No matter what yours may be, try the line of least resistance: *Talk to Torrington!*

THE TORRINGTON MANUFACTURING COMPANY
OF CANADA LIMITED
OAKVILLE, ONTARIO • TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA

SECTION A

Electrics

CARD NO.

Stock solenoids ..... (200)

Insulated terminals ..... (201)

Magnetic amplifiers ..... (202)

Synchronous motors ..... (203)

Flexible conduit ..... (204)

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Connector and plug holder ..... (207)

PYLC rotary actuators ..... (208)

Electronic multimeter ..... (209)

Storage battery ..... (210)

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Vacuum-tube voltmeter ..... (212)

Fractional motors ..... (213)

Tap connector ..... (214)

AN connectors ..... (215)

Machine limit switch ..... (216)

Capacitors ..... (399)

Magnetic drive ..... (400)

Sampling switch ..... (401)

Lamp transformer ..... (402)

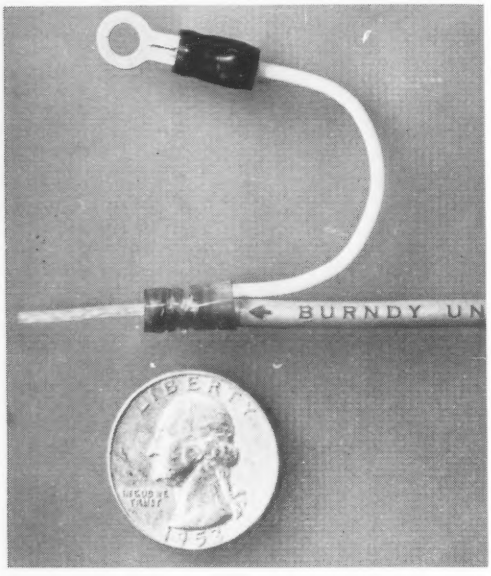
Ferrite cores ..... (403)

"D" frame motors ..... (404)

Stock solenoids

A complete line of custom-designed stock solenoids is offered by **Dormeyer Industries.** There are 17 models to provide 34 widely differing specifications. Pull and/or push capacities range up to 45 lb., sizes from 1⅜ in. by 1⅜ in. to 3 in. x 3 in., stroke lengths fractional to 2 in.

All solenoids are built to rigid standards. Double shading coils provide high sealed pull without hammer or excessive a-c hum. (200)



Insulated terminals

A new method of terminating wire is offered by the **Burndy** Bandolug. This machine feeds band-mounted, fully formed, fully plated, one-piece, insulated terminals into a die set, ready for automatic application to the wire. The operator merely inserts the wire into the connector barrel and the compression installation is instantly completed.

Nylon-insulated terminals (known as Insulugs) are secured mechanically to flexible metal band and machine-fed for accurate crimping. After the crimp has been made, the metal band is automatically disposed of by a cutting tool built into the installation die. The cutting tool can be removed. (201)

Magnetic amplifiers

Long life magnetic amplifiers containing no tubes or moving parts, with instant farm-up and power gain up to a million per stage have been developed by the **Electric Machinery and Equipment** Division of American Electronics, Inc.

These units may be used in voltage and frequency regulators for ac or dc motors, and in areas where dc power supplies are used for computers, planes and missiles, ground power, laboratories, phototubes and general production tests.

The amplifiers, consisting of a saturable reactor and rectifier, are shock and vibration resistant, have wide ratings ranging from microwatts to hundreds of watts and are practically maintenance free. (202)

Synchronous motors

A data sheet describing its synchronous timing motors has been released by **The Lux Clock Manufacturing Company.** The motors feature bearings that require no lubrication and are designed specifically for use in timers subjected to temperatures up to 165 F.

All specifications are included as well as a complete description of special features and uses. Some of the applications include gas and electric range timers, animated display timers and timers for packaging and plastic molding machinery. (203)

Flexible conduit

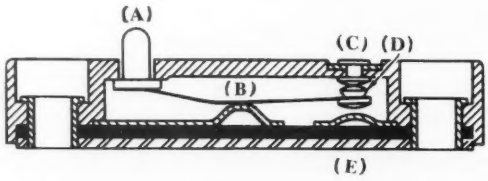
Flexible electrical conduit type CSA is the first of its kind to gain Canadian Standards Association approval for use in wet locations both indoors and out. This liquid-tight conduit known as Sealtite is manufactured by The American Brass Company. It is sold in Canada through **Anaconda American Brass Ltd.** It has applications in the transportation, machine tool, pulp and paper, chemical, mining, food and beverage processing industries.

The tough, extruded polyvinyl chloride covering over the flexible metal core protects wiring against moisture, oil, dirt, chemicals, corrosive fumes and abrasion. (204)

Solderless wiring

Terminals and connectors may be crimped to wire extremities with new solderless wiring devices developed by the **Electric Terminals Corp.**

Crimping time is reduced and more positive, permanent connections can be made because the new wiring devices provide an improved target area for the crimping tool operation. No skill is required. Terminal and connector barrels are made a full ¼ in. long to provide ample room for the nose of the crimping tool. This extra space ends fumbling on the production line and reduces rejects. (205)



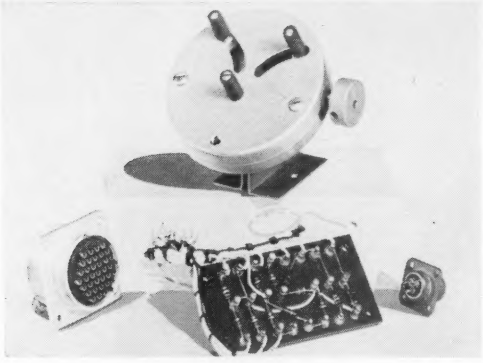
Snap-acting switch

A precision miniature snap-acting switch for control and indicating circuits is made by **Detroit Controls Corporation.** The spring mechanism of this Tyni Switch is a single stamping, processed to give a positive snap-action. The elimination of connecting elements in the spring design provides a higher than average contact pressure, making possible a high switch rating in a relatively small space.

Operation:

Pressure applied to pin plunger (A) is transferred to spring blade (B) made of beryllium copper. When the actuating force (pressure) on (A) exceeds the resistance of spring blade (B), the free end of (B) snaps down at high speed, breaking contact (C) and (D) and making contacts (D) and (E).

When pressure on pin plunger (A) is released, a point is reached where the return pressure of spring blade (B) exerted on pin plunger (A) permits (A) to return with a snap (again at high speed) to its normal position, breaking contacts (D) and (E) and making contacts (C) and (D). (206)

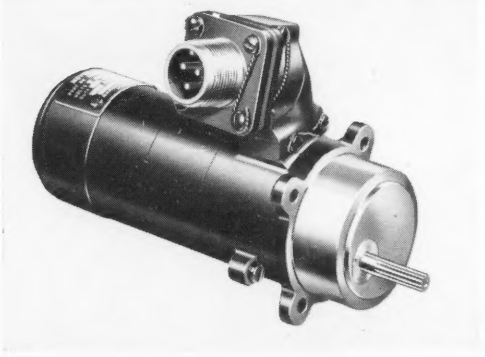


Connector and plug holder

A versatile device for cutting down on time required to make connections to electronic and electrical plugs is the Jiffy connector and plug holder, Model 157, now being marketed by **Macdonald & Co.**

It firmly holds any size Cannon or Amphenol connector or plug and also holds such shapes as resistor boards, tin cans and many other components for easy soldering or assembly. It has the advantage of being adjustable so that the work can be set for the fastest and most convenient position for the operator.

While the Jiffy grip holds the connector or plug tight, regardless of the size or the weight of the wires, it is thoroughly safe and will not crush, break or "egg-shape" the work being held. Also, the threads will not be damaged. (207)



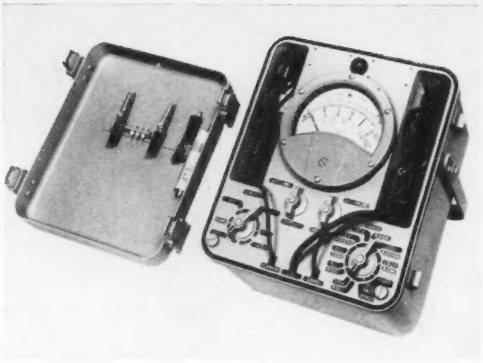
PYLC rotary actuators

A recent addition to their line of aircraft controls, the electromechanical rotary actuator, as manufactured by the **Barber-Colman Company,** was designed to meet an aircraft fuel control system manufacturer's requirements for an emergency fuel valve operator.

In just two tenths of a second, this small, compact unit moves a 7.5 pound-inch load 95 degrees, performing in ambient temperatures ranging from —65F to +200F.

Travel limit switches are integral and adjustable for strokes from 0 to 300 degrees. Output shaft is 3/16 in. diameter, serrated.

A Barber-Colman permanent magnet motor furnishes driving power. Shorting the motor armature leads through external switching provides dynamic braking. Length, from the face of the mounting pilot to the end of the motor, is only 4 5/32 in. (208)

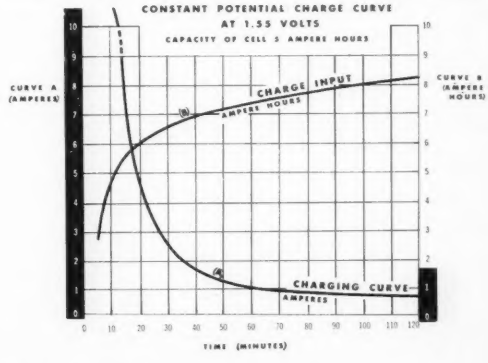


Electronic multimeter

The model NE No. 7-20-M electronic multimeter, available from **Computing Devices of Canada Ltd.,** is a compact, portable multirange meter identical to the military model TS-505B/U for measuring the rms values of ac voltages from 0 to 150 volts, dc voltages from 0 to 1,000 volts and dc resistance from 0 to 1,000 megohms.

An rf adapter is furnished to extend the range into the values of rf voltages up to 40 volts rms with frequencies up to 500 mc. The over-all accuracy of the unit is ±4% in ohms, ±5% in dc volts and ±6% in ac volts. An added feature is a plus or minus dc position which enables the user to quickly check the polarity of dc voltages or for zero voltage.

The instrument is impervious to damage by excessive humidity or even water immersion. (209)



Storage battery

In the sintered plate construction of the batteries made by **Nickel Cadmium Battery Corporation,** the active materials are held in place in the fine pores of a micro-porous sintered nickel plaque of extremely high surface area. This method differs in principle from the pocket type of construction and from the customary types of storage battery that consist of pasted plates.

The sintered plaque is manufactured by sintering carbonyl nickel powder in a hydrogen atmosphere after forming the powder into a compact containing a grid. The sintering process and design of the compact confer the mechanical properties, including porosity and pore size distribution, desired for the particular battery application. After the sintering process these plaques have a pore volume of approximately 80%. (210)

Hermetic seal terminals

Type LT fluorocarbon hermetic seal terminals are available from **International Resistance Co.** These terminals are miniature units for hermetic sealing of all types of electrical components, and are designed to meet all military and commercial requirements.

The type LT terminal offers high resistance to thermal shock (—70C to +190C) and zero water absorption. It is unaffected by high humidity and is chemically inert to organic solvents, acids, alkalies, oils and fumes. (211)

Vacuum-tube voltmeter

The first vacuum-tube voltmeter ever to combine 100 millivolt full scale sensitivity with duel and differential input features has been developed by **Allen B. Du Mont Laboratories, Inc.**

Designated Type 405, the instrument features d-c performance from two millivolts to 1,000 volts with 121 megohms input resistance. The a-c performance is highly accurate from below 50 cycles per second to ultra-high frequencies.

As an ohmmeter, the scale of the instrument is calibrated from zero to 500 with eight multiplier ranges from X1 to X10 megohms. It is functionally designed to reduce fatigue factors, reading difficulties, and other human accuracy deterrents associated with electronic instrumentation.

With the provision for dual input measurements, either a-c or d-c, two voltages may be measured by merely flipping a front panel switch. This feature eliminates the need for moving probes from one circuit to another. Also, the instrument can be zeroed without having to disturb the circuit. (212)

Fractional motors

Smaller, more powerful motors, the AL-4 Micro-Motor, and the AM-4 Mono-Motor, have been introduced by the **Redmond Company, Inc.**

They are adaptable for a variety of applications in heating, ventilating, air conditioning, and refrigeration, or they can be fitted for specific requirements.

Available in 1/250 to 1/15 manual hp range, the AL-4 features extremely close tolerances which provide a uniform air gap, exact bearing alignment and elimination of magnetic wedges. (213)

Tap connector

A fully insulated, one-piece tap connector for shielded or coaxial cable has been developed by **Burndy of Canada Limited.**

Called Uniring, the connector offers a saving in installation time over any previous method of connecting or grounding. It is composed of a one-piece combined inner and outer ring and nylon insulation. The inner ring slides under the shielded braid as the tap wire is held between the braid and the outer ring.

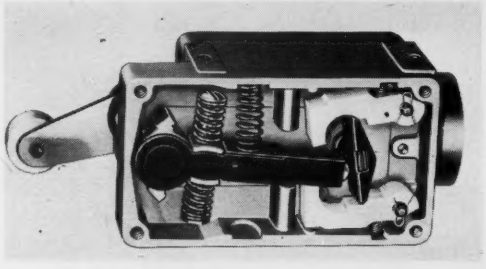
It is constructed so that the inner ring remains unaffected by the crimping process, ensuring maximum protection of the cable.

Single or multiple taps, from either the front or the back of the connector, can be accommodated. A single crimp with a basic Burndy Hytool completes the assembly. The nylon insulation is color-coded for size and identification and extends beyond both ends of the Uniring. This eliminates metal-to-metal contact and prevents wire chafing. (214)

AN connectors

In one compact unit, conforming to standard AN connector mounting dimensions, **Burndy's** Unilok offers the advantages of a gang connector, or a separable connector for each circuit. Small terminals allow the completed harness to be pulled through openings no larger than the cable bundle itself. Circuit checks are simple in either fully or partially assembled uniloks.

The probes reach insulation grip of the socket terminating each wire. Any wire is easily inserted or removed from the plug individually. (215)



Machine limit switch

A heavy duty machine limit switch has been introduced by the **Clark Controller Company.** Features of the Type DM switch include increased wiring space, protection against excessive overtravel achieved without shear pins, complete separation of electrical and mechanical mechanisms, and nylon-to-steel wearing surfaces.

The switch is conservatively rated at 10 amperes continuous capacity up to 600 volts ac, 550 volts dc. It is available with ½-in. or ¾-in. conduit connections.

A heavy one-piece molded insulating chamber surrounds all live parts, supports wiring terminals, and shrouds the moving contact arm to prevent fouling by wire leads. The need for use of insulating cloth is eliminated.

Space has been provided for four No. 12 wires. Insulated connectors may be used, but multi-level terminals are provided to permit use of uninsulated pressure-type connectors. Available in Canada through Railway Power and Engineering Corp. (216)

Continued on page 96

DUE TO A LACK OF PHOTOGRAPHIC CONTRAST
BETWEEN TEXT AND BACKGROUND, PAGES 43,
51, 59, 67 AND 75 DID NOT REPRODUCE WELL.

SECTION **B**

Fans, air-conditioning & heating

CARD NO.

Box furnaces ..... (217)

DFE dual frequency fan ..... (218)

Wrap-around tank heater ..... (219)

Mag cooling fans ..... (220)

Induction heating machine ..... (221)

Thermo-guard unit ..... (222)

Cooling tower ..... (223)

Temperature compensating coupling ..... (224)

Electric radiant heater ..... (225)

Floor-stand air conditioner ..... (226)

Constant temperature ovens ..... (227)

Cabinet cooling fans ..... (228)

Window fan ..... (229)

Component oven ..... (230)

Rotary hearth oven ..... (231)

Dust collector ..... (232)

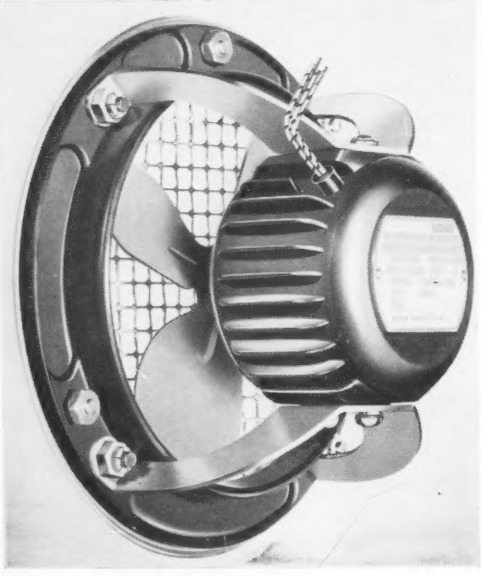
Induction hardening ..... (233)

New furnace ..... (234)

Rotary-vane air pump ..... (235)

Box furnaces

A bulletin describing specifications, temperatures, ratings and dimensions of G-E box furnaces is available from Industrial Heating Equipment Sales, **Canadian General Electric Company.** These box-type furnaces with cooling chambers, equipped with ribbon-resistor heating units for maximum temperature of 2,050 F, are suitable for brazing, annealing, bright normalizing and reduction of metallic oxides. The use of this type of furnace, at temperatures 2,000 F and above, is limited to protective atmospheres which will not carburize the heating units. (217)



DFE dual frequency fan

To cool instrument cabinets and electronic test equipment which must operate from either a ground 50-60 cps power supply or the 320 cps to 1,000 cps power supplies encountered on aircraft, **Rotron Manufacturing Company** has brought out a fan which will operate on the above frequency spectra. These fans will operate on either single-phase or three-phase power, at any specified voltage, and in accordance with existing military specifications for this type of equipment. Fans of 4 in. and 4½ in. diameter are available, delivering from 75 to 115 cfm at 60 cps.

The company also manufactures Model HF fans for flushing relay racks and transmitter cubicles and for cooling rectifier stacks, and small and medium size centrifugal blowers, simplex and duplex, regular and with the motor inside of the blower wheel to conserve space. (218)

Wrap-around tank heater

Whether you plan fast recovery or conventional water tank production, **Canadian Westinghouse Co. Ltd.'s** wrap-around water tank heater comes in sizes and electrical ratings to meet all requirements. For unusual applications, special heaters can be supplied.

Once around the tank, the heater is drawn snug by a tension clamp with leaf or coil spring. Extension band assemblies are available when the heater length is less than the tank circumference. Gripper-type terminals provide quick and firm connections. Positive contact, the full length of the wrap-around heater, delivers a low, even heat to tank wall. (219)

Man cooling fans

Portable, man cooling units employed for blowing air at workers engaged in hot spaces, such as furnace fronts, are offered by **Vokes (Canada) Ltd.,** representing Keith Blackman Ltd.

Of steel construction, the unit comprises motor-driven propeller-type fan, mounted on a supporting column fitted to a steel base. Units are mounted on castors and may be supplied with a 24-in., 30-in. 36-in., or 42-in. diameter fan.

A smaller unit, with either 15-in. or 18-in. diameter fan is also supplied, without castors. These fans can be arranged for suspension from roof girders. (220)

Induction heating machine

The 50 kw, 500,000 cycle Toccotron induction heating machine, with a frequency range of 350,000 to 600,000 cps, is ideal for surface hardening small diameter parts to shallow depths, through hardening or annealing small sections and soldering or brazing small assemblies where the heating effect must be very strictly localized. It is manufactured by **The Ohio Crankshaft Company.** (221)

Thermo-panel coil

Men in the electro-plating field, chemical processing, petroleum industry and others will be interested in the Dean shallow embossed thermo-panel coil which is bent to the shape and size of trough wanted. No jacketing is needed; nor any pipe or tube coils. A product of **Dean Thermo-Panel Coil Division** of Dean Products, Inc., the coil effects a saving in cost, weight, and installation time. (222)

Cooling tower

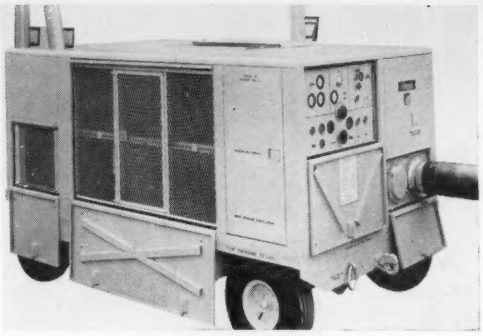
Developed specifically to provide economical water cooling for industrial processes and air conditioning, the Loline of Pritchard cooling towers is offered by **Poole-Pritchard, Ltd.** Built of heart redwood, the unit is designed to withstand wind loads of 100 mph. Multiblade, propeller-type fans with adjustable pitch aluminum blades are standard equipment. The totally enclosed, fan-cooled (TEFC) motors are mounted vertically and require no additional protection against the weather. (223)

Temperature compensating coupling

A simple, positive, temperature compensating quick disconnect coupling, to be used with the Toruseal "O" ring for sealing air and liquids from high vacuum, is announced by **Winnett Boyd Limited.** This coupling has operated successfully at temperatures from—95 F to 1,500 F and from high vacuum to pressures in excess of 1,800 psi using helium gas, as well as hydraulic pressures in excess of 3,500 psi in the light-weight aviation construction. (224)

Electric radiant heater

An electric radiant heater for evaporating the solvent from synthetic resin solution used to coat abrasive cloth is announced by **Canadian Chromalox Company Limited.** Nine radiant heaters are mounted on each side of the web of cloth and three at each end. This arrangement assures even heating from edge to edge of the cloth. Maximum speed of the web is one foot per minute up to 10 ft. per minute. (225)



Four-wheel air conditioner

Mobile, four-wheel air conditioners for use in testing and preflighting of jet aircraft are being produced at **American Electronics, Inc.** The model MA-7 is powered by an air-cooled engine, and the Model MA-8 by an electric motor.

The Model MA-7 features a self-mobility system for manoeuvrability around aircraft at one mile per hour.

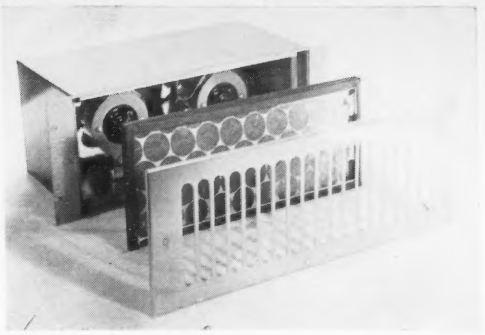
When used for cooling, the conditioned air discharge is manually controllable between 35 F and 65 F. The selected temperature is automatically held to ±3 F when operating at full capacity, and to ±5 F when operating at loads less than full capacity.

When heating, conditioned air discharge temperature is manually controllable between 70 F and 200 F at any flow rate between 10 and 60 pounds per minute. The selected temperature is automatically held at ±10 F. (226)

Constant temperature ovens

Intended for a variety of laboratory uses including general drying, dry sterilization, baking of varnishes, and paraffin embedding, a new line of constant temperature ovens has been designed by **Central Scientific Company of Canada Limited.** They are suited to applications where precision-controlled temperatures from 60 degrees to 250 degrees C are required.

Features include: an improved chamber design providing an efficient combination of air circulation and heat retention with maximum storage capacity; nickel-chrome strip heating elements, mounted between the inner and outer walls of the chamber, are sealed off from the air in the chamber to reduce the possibility of gaseous explosions; a senstitive hydraulic-type thermostat; a choice of two sizes in either forced air or gravity circulation models. (227)

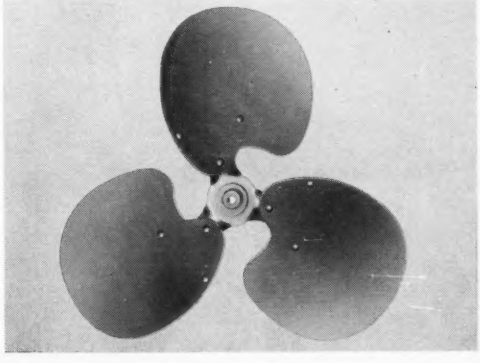


Cabinet cooling fans

A practical method of pressurizing electronic cabinets with filtered air is possible through installation of cabinet cooling fans as manufactured by **McLean Engineering Laboratories.**

Excessive or fluctuating temperatures in electronic racks cause tubes to die young and make crystals, transistors and other sensitive electronic equipment perform erratically. This, in turn, results in expensive down time and high replacement costs. Use of these fans in computers, control systems and data processing systems, in accounting machines and in other precision electronic units will eliminate these problems.

The fans are specifically designed to fit standard 19 in. electronic racks. They are small packaged units that pressurize the cabinet with cool, filtered air, preventing dust from entering through cracks and joints. (228)



Window fan

The new Model YOX 20-3 fan has been designed by **The Torrington Manufacturing Company of Canada, Ltd.** to provide reduced axial depth in window fan units while avoiding the vibration and noise problems encountered with conventional offset window fans. The blades of the fan, while secured directly to the hub, are shaped and angled back so as to overlap around the drive motor.

The fan is available in a 20 in. diameter and standard blade depths of 2⅜, 2-31/32 and 3-17/32 in. depending on performance requirements.

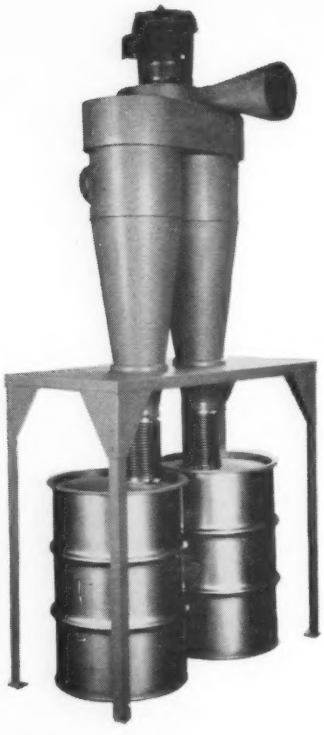
Standard construction includes mill-finished aluminum blades, steel spider and rubber-bushed hub; spider and hub are either zinc-plated or black-lacquered. All blades are statically balanced and individually gauged for contour and alignment. (229)

Component oven

A standard unit, which controls the temperature of crystals and electronic circuitry, is available from **Williamson Development Company, Inc.**, for use on 115-volt circuits having a 35-watt heater and bimetal thermostat control. The unit will control to 5 C at a setting of 75 C in ambient of 0 to 60 C. (230)

Rotary hearth oven

This oven is designed to permit loading and unloading from the same position by a single operator, and also to permit a continuous movement of work in and out of the heating zone. A large volume of work space is obtained with this rotary design, which is made by **Grieve-Hendry Co.** Standard speed range from 2 in. to 10 in. per minute makes this oven practicable for processing many types of products. (231)

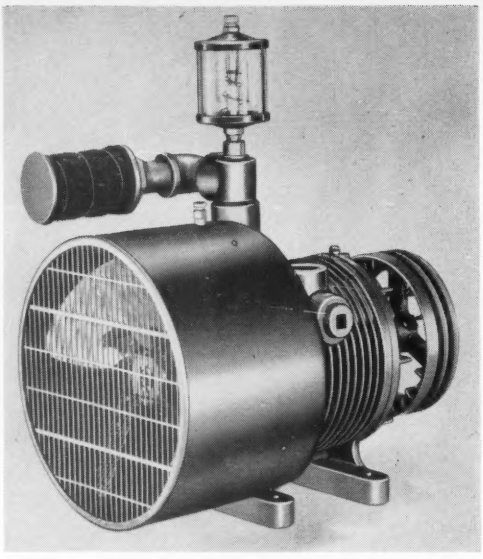


Dust Collector

Large volumes of bulky dust can be effectively trapped from the air by **Torit Manufacturing Company's** 219-FB-55 dust collector (their largest cyclone separator unit) which has been fitted with connections to standard 55-gallon drums.

This collector is intended for use with machinery that creates great quantities of dust, buffing lint, chips or shavings. Centrifugal force precipitates all but the very finest particles into the drum; an automatic airtight sealing feature on the drum cover eliminates the need for clamps and the drums can be changed in 30 seconds.

The 219-FB-55 is equipped with three after-filter bags that trap the remaining fine particles, permitting the recirculation of clean filtered air back into the building and preventing considerable heat loss in cold weather. It is also available where outside exhaust is required. (232)



Rotary-vane air pump

Model 4565 rotary-vane air pump delivers twice the capacity of the largest model formerly made by **Gast Manufacturing Corporation.** Designed for continuous service as either a compressor or vacuum pump, the unit is air-cooled by a 10 in. diameter pitch fan externally mounted on a rearend shaft extension. Air is directed by a combination cowl and fan guard, eliminating the complications common to water-cooling.

As a compressor, the unit includes 1 in. pipe size automatic lubricator and felt type intake filter, adapted to such applications as atomizing No 5 or No 6 fuel oil on industrial oil burners for packaged boilers. Used as a source of air pressure independent of plant air lines, the pulse-less air delivery of rotary design eliminates the need for an air tank. As a dry vacuum pump, the unit's 45 cfm capacity enables it to replace two smaller pumps on such applications as paper or sheet feeding on printing presses. (235)

New furnace

A design of stress relief-anneal furnace has been placed in operation by **Canadian General Electric Co.**

The furnace introduces a new treatment process of exceptionally rapid heating and rapid cooling in two separate chambers. The first chamber utilizes high pressure atmosphere flow to force heat equally throughout the one ton load. Heating of the load to 1300 deg. F. is accomplished in 90 minutes, permitting five full treatments in an 8 hour day.

The second chamber utilizes a separate source of high pressure atmosphere to remove the heat from the one ton load. As the furnaces are electrically heated, contamination of metal surfaces by combustion products is impossible.

Both the heating and cooling chambers are automatically controlled, releasing labour for other shop duties.

Handling of the one ton loads is accomplished by loading either the cast or forged metal parts into shielding retort baskets that form an integral part of either the heating or cooling chamber.

A metal heating survey may be obtained from the company. (234)

SECTION C

Fasteners

	CARD NO.
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Anchor nuts	(246)
Stainless fasteners	(247)
Spring tension fastener	(248)
Spring tension latch	(249)
Loctite sealant	(250)
Blind fastener	(251)
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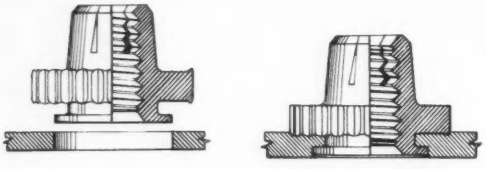
Locking inserts

A miniaturized series of self-locking inserts has been introduced by the **Heli-Coil Corporation** to meet the needs of design engineers over a wide range of small, precision applications. The new 4-40 screw lock series was designed to reduce the space and weight limitations of handling fastener problems on electronic, automotive, aviation, machine tool and instrument assemblies. Easily installed, they are useful in miniature subassemblies where clearance or inaccessibility does not permit the use of external locking devices. (236)



Press-nut

Ranging in thread sizes from 2 to 10, the **Rosan** press-nut offers a securely fastened nut in sheet metal. Flush mounting is obtained with a sheet thickness as low as 0.035 in. Design configuration locks the nut in the parent sheet, both radially and axially, in order to develop the full strength of the mating bolt.

A self-locking feature, (in press-nuts made of 303 stainless steel) is designed to meet government specifications AN-N-5 and AN-N-10, covering self-locking nuts. These are also available without the self-locking feature. Installation is quick and simple: it requires only a hole in the parent sheet into which the nut is pressed. Simply drill or punch a hole in sheet metal to specified diameter. Insert smaller flange into the hole. Apply impact force to exposed edge of the serrated flange of the press nut. A commercial version of the nut is also available in Ledloy steel. (237)

Self-sealing screws

Increased demand for commercial versions of high-pressure sealing devices (originally intended for military uses) has caused **Automatic & Precision Mfg. Co.** to broaden its line to include Seelskrews for applications in the marine, air conditioning, refrigeration, food and chemical fields. The units permit a combination of sealing and locking (even when vibration is encountered) at only a small additional cost. They are particularly useful when dust, moisture or vapor must be kept out of a cabinet or enclosure.

Seelskrews are standard machine screws with an O ring pressed into a groove under the fastener head. When used on a panel, housing or cabinet, tightening the Seelskrew compresses the O ring and gives vibration resistance and high-pressure sealing. The installation looks the same as it does with conventional screws and, since it is of one-piece construction, there is no problem of assembly or storage of spare parts. The screws maintain their seal even after frequent removals from equipment. (238)

Screw packaging

Stelco hexagon head cap screws are packaged in quantities recommended by the Canadian Fasteners Institute. This program was developed as a means of standardizing fastener packaging and introduces convenience and economy in shipping, storing, and handling. Manufactured by **The Steel Company of Canada, Limited,** the screws are now available from wholesalers. They may be ordered in cases, packages, or in bulk lots. (239)

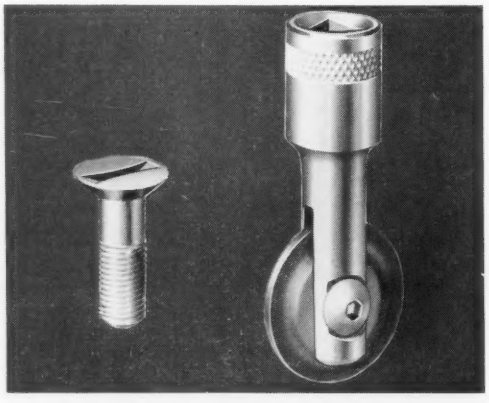
Nylok bolts

In the Nylok self-locking, self-sealing principle, which is effective on any threaded device, the locking medium is a tough resilient nylon pellet inserted in the body of the bolt, screw and special fastener. They are manufactured by the **Buffalo Bolt Co.**

This locking medium projects slightly beyond the crest of the thread and when the mating parts are engaged the highly resilient nylon is compressed but not cut. Its spring-like wedging action grips threads tightly and sets up a counter-thrust, creating strong metal-to-metal engagement of the mating threads. Nylok will lock in any position, along the threads. Seating is unnecessary. (240)

Steel fastenings

Catalogue (No. 56-A) issued by **Star Stainless Screw Company** covers 7,000 items, listing new sizes and types and a number of new products. Continuous or piano-type stainless steel hinges and butt hinges in blank, fixed and loose pins are described. (241)

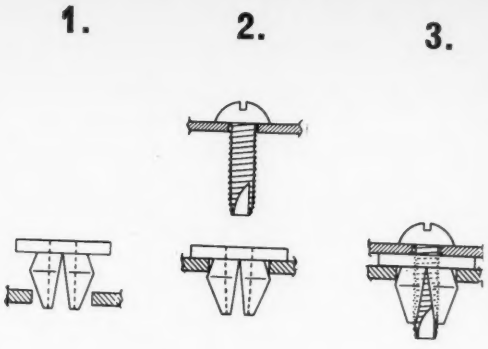


Hi-Torque fastener

A new type of recess design for screws, bolts, blind bolts, cowl fasteners and all other turning types of fasteners, which is said to deliver higher torque values than have ever been possible is announced by **The Pheoll Manufacturing Company.** While the amount of torque naturally varies with the size and type of screw or bolt, it is claimed that the new design, called Hi-Torque, makes possible torquing values of at least two times torque requirements for all types and sizes.

The fastener features a recess with an accurate slot undercut on both sides and with driving surfaces parallel, and employs a 360 degree driving blade. These innovations result in full bearing thrust of the driving blade against the driving surfaces, elimination of the camming action which tends to force the blade out of the slot, plus longer driving blade life.

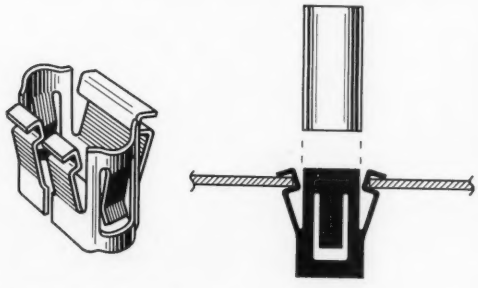
Other advantages are greater head strength, smaller head sizes and positive inward thrust in driving or removal. The Hi-Torque recess can be driven from either a horizontal or vertical driver position or from any angle by use of a universal joint. (242)



Plastic grommets

Grommets of plastic known as Shakeproof Plastigrommets (made by **Canada Illinois Tools Ltd.)** are blind screw receptacles with many uses such as insulation spacers in refrigeration, leveling screw holders and so forth.

They have been used, for instance, as a spacer between the inner liner and evaporator of a refrigerator, thereby replacing a special plastic spacer with two studs fitted into a twin bush-on; as a receptacle for a 5/16-in. thread-cutting screw in the legs of a stove while in the packing crate; as a screw for leveling the stove when it is set up in the kitchen. This method eliminates the nut previously welded to the foot of the stove; as a fast easy way to hold the handle of an oven, broiler or storage drawer to the door of the respective compartment. (243)

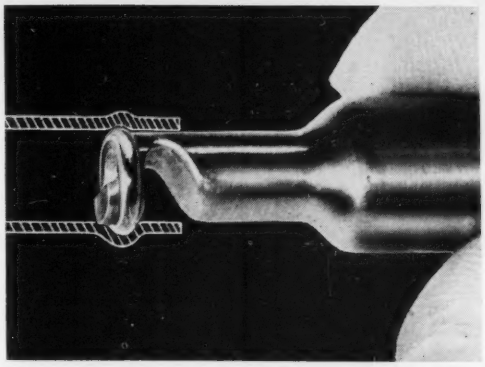


Tinnerman speed clips

A simplified technique of assembling or replacing crystal canisters in electronic equipment is being offered by **Dominion Fasteners Limited,** Canadian manufacturer of Tinnerman Speed Nut brand spring tension fasteners. Formerly, crystal-containing canisters were either riveted or screwed to the chassis. When service was required these components were often inaccessible. Once the Speed Clip is snapped into place on the chassis crystal cans can be assembled or changed easily.

Assembly is simple. The clip is pressed into place by hand on the chassis where it retains itself in canister-receiving position. As the crystal canister is inserted, spring fingers formed in the clip bear against its sides and secure it firmly under live spring tension.

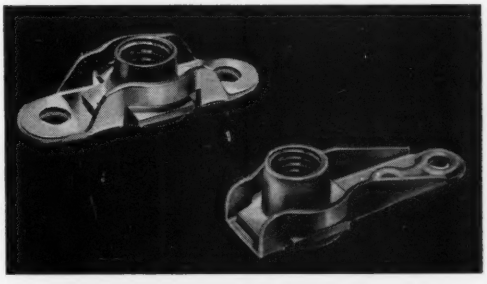
Changing of the crystal can simply requires slipping the spent canister out of the clip and replacing it with a fresh one. The clip remains intact on the chassis and can be used indefinitely. (244)



Tube fitting

A special fitting designed for easy intallation in all types of flexible tubing requires no welding, no special adhesives, no threading. This design is reported to assure a joint as strong as the tube itself and does not reduce I.D. or flow. **The Danielson Manufacturing Company** introduced this tube fitting especially for plastics and rubber tubing.

Making a tight, strong fitting is completely mechanical. The Danco fitting (elbow, tee, 90 degrees or special design) is slipped on the tube. Using the special ring holder, a non-corrosive ring is inserted into the tube. Tightening the molded nylon Danco fitting completes the operation. The joint is sealed tight, strong, and of light weight. Special fittings for a wide range of tubing applications are available. (245)



Anchor nuts

A full line of reduced height, counterbored self-locking anchor and gang channel nuts has been developed by the **Elastic Stop Nut Corp. of America,** to meet the requirements of the new NAS680-695 drawings.

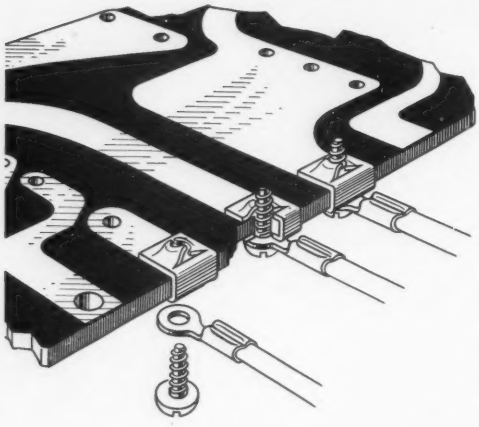
The new LHTA series is designed with minimum envelope dimensions compatible with performance requirements for structural aircraft applications. Featuring reduced height, width and weight, the parts develop the full tensile, vibration, twist-out and push-up requirements of MIL-N-25027 (ASG). Made of heat-treated carbon steel, they perform satisfactorily at temperatures up to 550 F.

A counterbore of 0.060 in. in the base of the nut minimizes the need for (and weight of) the extra shims usually used to prevent bolt threads in bearing. The reduced height permits the use of short-thread-length NAS bolts; this further reduces the weight of the nut-bolt assembly in many applications. Thread sizes currently included are 8-32, 19-32, ¼-28 and 5/16-24. (246)

Stainless fasteners

A 12-page catalogue of stainless steel AN fasteners is available from **Allmetal Screw Products Co., Inc.,** manufacturer of stainless steel fasteners. It describes government specification aircraft bolts, slotted and Phillips machine screws, flat and round rivets, and washers carried in stock.

Illustrations, stock sizes, principal dimensions, and explanation of part and dash numbers are included for each item. (247)



Spring tension fastener

A leading manufacturer of electrical equipment has adopted a Tinnerman U-type speed nut **(Dominion Fasteners Ltd.)** for making fast, positive attachments of electric wires to printed circuit panels.

These phosphor-bronze fasteners completely eliminate soldering, and are merely snapped by hand over the edge of the circuit panel, where they firmly grip the printed terminal areas for maximum contact. An extrusion in the lower leg of the nut snaps itno the mounting hole and locks the part in place, thereby permitting wiring connections to be made at any convenient location. Terminal clips are then positioned on the lower leg of the fastener and screws are driven to complete the assembly in seconds. The manufacturer uses up to 18 U-Type speed nuts on this application. (248)

Spring tension latch

For fastening slide-out drawers and hinged panels the Southco Arrowhead Latch is recommended. A product of **Southco Division,** South Chester Corporation, this latch locks or opens with a quarter turn yet occupies less than ½ in. inside space.

Doors are held under spring tension — a push against the arrowhead knob relaxes this tension and allows operation with ease. Drill a single hole for installation; no fastening to the door is necessary. No striker plate is needed. (249)

Loctite sealant

Users of nuts, bolts, screws, in fact threaded fasteners of all kinds can now obtain whatever locking torque they desire by using Loctite Sealant. Exclusive Canadian representatives are **J. S. Parkes & Company Limited.** The sealant wicks into the engaging threads and hardens automatically to form a tough heat and oil resistant plastic. By varying the engaged length or changing the grade of sealant, the user can control the gripping torque to meet his specific requirements. (250)

Blind fastener

A rivet type fastener of hardened alloy steel for blind application is available from **Huck Manufacturing Co.**

Designated the Tau Bolt fastener, the device is ¼ in. wide. It is available in a variety of grip lengths with either countersunk or brazier head. It features positive mechanical lock, high shear strength and high tensile preload.

Pins break flush with the collar when the fastener is driven, and shank dimensions are held to unusually close tolerances to permit interference fit fastening designs. It is a four-piece design, consisting of pin, expansion sleeve, filler sleeve and locking collar. The solid steel collar locks the pin permanently in position.

Driven with a standard pneumatic or hydraulic tool, the fastener is automatically and uniformly installed, resulting in absolute sheet pull-together. High tensile strength is assured by the expansion sleeve design. High tensile preload is inherent in the installed fastener because installed force is double the rated strength. (251)

Pre-assembled fastener units

Pre-assembled lock washer and screw units, marketed under the name of Shakeproof Sems, completely eliminate the costly, tedious operation formerly required for separate lock washer handling. They are manufactured by **Canada Illinois Tools Ltd.**

The lock washers can't get lost and can be hopper fed for automatic driving. Especially designed to fit over the screw blank, the rolled threads hold the washer parallel under the screw head. Jamming or thread damage due to canting to the lock washer is prevented.

Special thread-cutting sems eliminate tapping and separate lock washer handling. Paint remover sems have a specially fluted shank to facilitate driving in tapped holes that have been clogged by paint in previous operations.

Three-piece terminal clamp sems obviate the need for looping wire ends when making terminal connections and decrease the hazard of losing terminal screws. (252)

SECTION D

Hydraulics & pneumatics

CARD NO.

Relief and back pressure valve ... (253)

Slide sequence valves ..... (254)

Solenoid valve ..... (255)

Hydraulic control pilot ..... (256)

Adapter fittings—o-rings ..... (257)

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Small bore cylinder ..... (408)

Regulating valve ..... (409)

Check valve ..... (410)

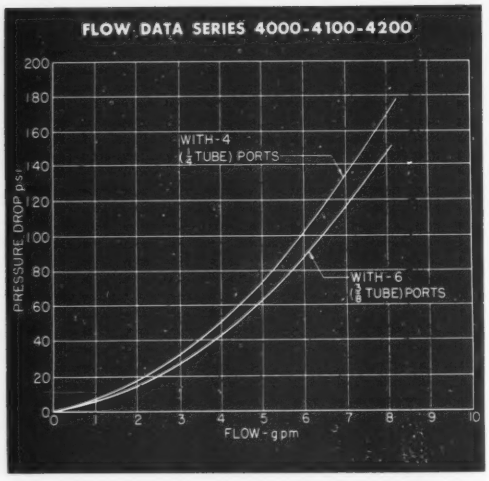
Air-powered grinder ..... (411)

Hydraulic fluid ..... (412)

Relief and back pressure valve

A spring-loaded relief and back pressure valve intended to function on both condensing and non-condensing systems is available from the **Atlas Valve Company.**

In condensing systems, this valve is used to maintain constant back pressures in the exhaust line from an auxiliary engine or turbine. On the condenser of any auxiliary equipment, it functions as a relief valve if the vacuum is lost. In non-condensing systems, the valve serves as a back pressure control valve. (253)



Slide sequence valves

The line of slide sequence valves, made by **Aircraft Products Co.,** exhibits extremely low leakages, and exceeds applicable MIL-specifications. The design embodies a fully balanced, self-cleaning spool selectively lapped into a rigid sleeve which is in turn hydraulically balanced to prevent bind.

A manufacturing technique has been developed to produce spools and sleeves that are perfection in roundness and finish. This permits extremely small clearances (in the low millionths of an inch) to maintain low leakages, and at the same time to provide the absolute minimum in hysteresis effect. Careful metallurgical control is maintained during heat treat, and double cold-stabilization is employed first in detail manufacture and later in the finished valve before final testing. Specification pressures are: operating, 3,000 psi; proof, 4,500 psi; burst, 7,500 psi. (254)

Solenoid valve

Precision-designed for guided missile systems and adaptable to industrial automation, a new line of unusually small and lightweight solenoid valves (with a special dual operating feature) is announced by Clary Corporation.

These two-in-one valves can be operated from either an "open" or a "closed" position, the conversion from one to the other being made by a simple mechanical rearrangement of the solenoid. One of the smallest and lightest solenoid valves made, the unit is 2 in. long and of 1 in. diameter; it weighs less than 10 oz. (255)

Hydraulic Control Pilot

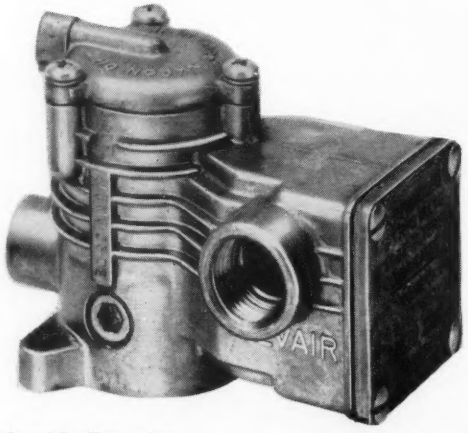
A spring-loaded, diaphragm-actuated hydraulic pilot (No. 811) made by **Atlas Valve Co.** is designed for accurate control of diaphragm valves. It operates off the city water supply or on light oil and combines the fast response of a relay with the stability of the wide proportional band controller. It is extremely accurate, responding to variations of as little as 1 psi in the flow line to readjust the main regulator for precise throttling of the flow. (256)

Adapter fittings—o-rings

Straight thread fittings with o-rings of the correct compound, mounted in properly machined straight thread bosses, will provide years of trouble-free, leak-proof service. They are distributed by **Railway & Power Engineering Corp.** Assembled Parker straight thread fittings are furnished with o-rings from Parker compound No. 145-140, unless otherwise specified. This compound is ideal for commonly used hydraulic fluid of mineral oil base, also for lubricating oil and pneumatic service — and is good for vegetable oil and water service. (257)

Pneumatic conveyor

The pneumatic conveying of dry, free-flowing materials and the equipment for such purposes are described in a brochure issued by the **U. S. Hoffman Machinery Corporation.** The Hoffco-veyer system is detailed as to types available, installations in operation, and possible applications. (258)



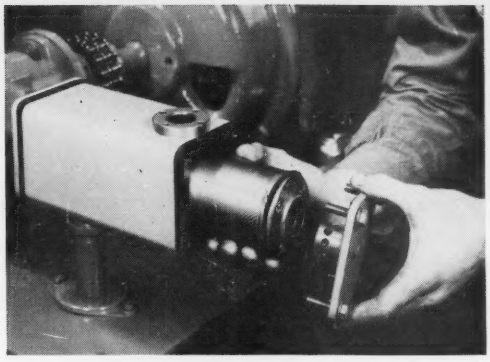
Solenoid pilot valve

A line of small solenoid pilot valves, capable of handling air, vacuum, oil, water and inert gases, is announced by **Valvair Corp.**

Available in both 2 and 3 way types, the valves are intended for control of Speed King remote pilot operated valves or direct control of small cylinders and similar devices. The valves are extensively used in laboratories and on precision production equipment, where accurate control and quick response are required.

Capacities range up to 23.8 cfm (air) and 3.8 gpm (hydraulic). Valves are said to be capable of controlling over 600 cycles per minute. The solenoid enclosure is dust and moisture proof, completely sealed to prevent the entrance of splashing liquids or airborne contaminants.

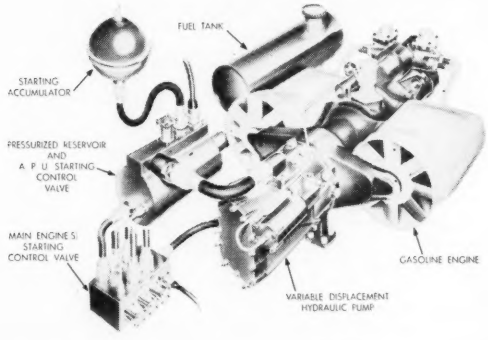
Cylinder ports are tapped ¼ in. NPT and electrical conduit connections are tapped ½ in NPT. Valves can be supplied for direct pipe connection, with sub-base, or drilled for mounting on customer's manifold. (259)



Hydraulic strainer unit

A device that notifies the user when the hydraulic strainer is dirt clogged, acts as a bypass valve to protect the pump, provides for easy strainer removal, and boosts the usable oil supply has been marketed by **The Rosaen Company.** Use of this unit, called the Telltale strainer, permits convenient outside location of the strainer where it can be serviced easily.

A red signal notifies the operator when the strainer is clogged and has been pulled aside by pump suction to allow the free flow of oil around it. Automated set ups can use an optional limit switch for a remote signal light. The strainer is easily removed. The usable oil supply is increased by up to 20% with this unit because the oil inlet pipe, no longer carrying a strainer, can be lowered farther into the tank. (260)


FUEL TANK
STARTING ACCUMULATOR
PRESSURIZED RESERVOIR AND A. P. U. STARTING CONTROL VALVE
MAIN ENGINE STARTING CONTROL VALVE
GASOLINE ENGINE
VARIABLE DISPLACEMENT HYDRAULIC PUMP

Hydraulic starter

A hydraulic starter package for aircraft turbine engines, which can be used as an auxiliary or emergency source of hydraulic power, is announced by **Vickers Incorporated.** Starter power source is a light-weight, air-cooled gasoline engine which drives a Vickers variable displacement pump. Oil under pressure powers a Vickers hydraulic motor mounted on the engine pad to start the turbine. Built into the package are controls that independently regulate the torque and the speed for maximum power utilization throughout the entire starting cycle.

This starter is available as both a mobile ground unit and as a permanently installed package in the aircraft. This arrangement provides hydraulic power for remote drive applications, as, for example, cabin air conditioning and surface controls. (261)

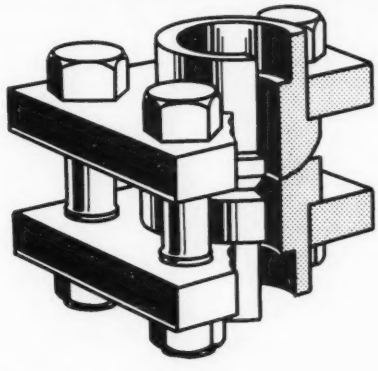
Hydraulic pit props

Hydraulic pit props which offer uniform resistance throughout the whole length of a coal face, so that the roof strata is securely and evenly supported right up to the waste edge are offered by **Dowty Equipment (Canada) Limited.**

High initial loading ensures stable setting, and inherent resilience absorbs sudden roof weight or strata movement, thus preventing any tendency for the prop to reel out.

The props are quickly set and withdrawn with minimum labor, and the accident rate is improved by reducing the task of timbering to a safe, easy operation.

The prop is erected single-handed under an appropriate roof bar in the desired location. The pump handle is inserted in the housing and the prop is extended by a light pumping action. (262)



Flange union

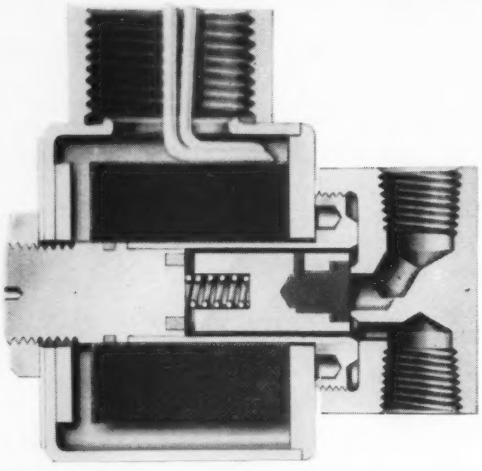
A flange union with socket weld connections is offered by **Almar Hydraulic Valve Company.** The union will withstand high operating pressures (to 3,000 psi for schedule 80 pipe) and special unions incorporating the same design can be provided to withstand pressures up to 10,000 psi.

The union has a true-ball seat and revolvable flanges. The true-ball seat assures leak-proof sealing even when there is a considerable misalignment of pipe. The revolvable flanges, on the other hand, make assembly much easier because bolts and bolt holes are readily placed into position.

The union can be reassembled many times and still retain its original sealing qualities. The new flange union is available for pipe sizes ranging from ⅛ in. to 6 in. (263)

Lubricated plug valves

Its line of Nordstrom lubricated plug valves is described and illustrated in a catalogue (PNV 965) issued by **Peacock Brothers Limited.** A wide range of types, sizes and pressure standards are covered by dimensions, details of end connections, and other data. (264)



Solenoid valve

A solenoid valve (the C-series) for the control of air, water, oils (gasoline and many other fluids and gases is offered by the **Skinner Chuck Co.**

This brass-bodied valve weighs only 12 oz. It is a packless, direct-acting valve, with just two moving parts; positive closing is assured by a spring return. It is said to be bubble-tight (even on vacuum), and will last through millions of cycles on most applications.

The valve has orifices from 5/32 in. to 7/64 in. with pressures ranging from 60 to 130 psi. Pipe size is ⅛ in. NPT. Construction of the valve is simple, and it can be taken apart for cleaning without removal from the line.

Typical applications include: automotive fuel systems, welding equipment, vending machines, lubricating devices and systems, spraying equipment, air horns, instruments and automated machine controls, water softeners and humidifiers. (265)

Butt joint fitting

A tube fitting that makes a positive butt joint, withstands high pressures, is not flared or threaded, and assures foolproof assembly is offered by **Alloy Metal Sales Limited.** These Imperial Hi-Seal fittings can be used with steel, stainless steel, copper, aluminum and monel tubing.

There is only one way the tubing can go into the sleeve and just one way the sleeve can go into the fitting. The fittings stay pressure-tight beyond the burst strength of the tubing itself.

Because of the butt joint, and because no flaring is required, this fitting permits bends to be made exceptionally close to the end of the tubing where space is limited. A dependable joint can be made even where there is a slight variation in the tube length or placement, or where the tube is not cut off squarely. There is no need to spring the tubing when making a joint. Repeated tight reconnections can be made without additional takeup. (266)

Electro-pneumatic timer

With this timer, air pressure is distributed to air cylinders, air presses, air hammers, work feeders, clamping fixtures, chip blowers and work ejectors — each independent of the other as to start, duration, and end of cycle. Called the Mead electro-pneumatic timer, it is available from **J. B. Morrison Machinery Co. Ltd.**

It is a simple matter to hook up six, twelve, or more air cylinders in numerous sequences from 2½ seconds to 33½ seconds duration. Cams mounted on the revolving shaft trip the miniature poppet valves, which, in turn, actuate the working valves and cylinders.

Normally, each of the six rotors carries two small cams, to charge and discharge a double-acting cylinder once in each complete cycle. Additional cams could be mounted on the rotor to actuate the cylinder more than once in each cycle, if desired. Duration of the complete cycle is controlled by the size of the gears on the rotor and motor shafts. (267)

Pressure control valve

A line of diaphragm-operated high pressure control valves especially designed for automated control is announced by **Sinclair-Collins Valve Company.**

Suitable for use in oil, air, steam, and hot or cold water service at pressures up to 6,000 psi, these valves provide superior operating characteristics, long service life, and ease of maintenance. (268)

Aircraft hydraulic motors

Development of a series of constant displacement axial piston type hydraulic motors is announced by **The New York Air Brake Company.** Designed for operation in 3,000 psi systems, the Stratopower 54F series are intended for use in aircraft hydraulic systems, but are adaptable to other hydraulic systems.

A range of eight sizes is offered from 0.1 through 1.0 cubic inch displacement. They are suitable for continuous, intermittent or continuously reversing duty cycles. The motor may be stalled indefinitely without damage. In reversing service, rotation is determined by the direction of flow through the motor. The nine-cylinder motors employ valve pistons placed in the same bore with the driving pistons and delivering approximately 180 degrees of power per cylinder revolution. The main hydraulic load in the motor is absorbed in tension in the shaft, avoiding the need for a thrust bearing. (269)

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SECTION **E**

Instrumentation & controls

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Pressure calibration tester ..... (272)

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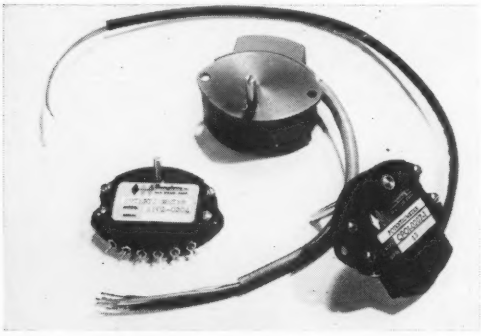
Damper actuators

The DH-O series of hermetically sealed damper actuators as manufactured by **General Controls** provide quiet, dependable two-position, or on-off control for such items as dampers, louvres, draught-doors, vents or valves.

Simple two-wire control circuit is standard on all units. Built-in return spring provides current-failure operation upon interruption or failure of power. Rotatable actuator clamp and choice of quadrant mounting for lever fulcrum provide flexibility of installation. Damper arm returns to normal (de-energized) position upon interruption or failure of power. (270)



Sector potentiometers

Especially engineered for control systems and instrumentation in aircraft and missile systems, a complete line of sector potentiometers has been introduced by **Humphrey Inc.** manufacturer of electro-mechanical instruments. They are models CP01-0103-1; CP01-0207-1 and CP01-0204-1.

These instruments are designed to measure angles from zero to a maximum of 90 degrees of shaft rotation. Accuracy is achieved to 0.5% and resolution to 0.10 degrees.

The instruments are of rugged, all-metal construction with high temperature insulation, capable of withstanding up to 300 F. They are particularly qualified for explosion-proof requirements; severe environmental conditions, vibration, shock and temperature.

All three models are available with shaft extension for either or both sides; also with terminals or with integral cable; and singly or in gang units. (271)

Pressure calibration tester

Accurate pressure calibrations not ordinarily possible with oil deadweight testers or mercury manometers can now be accomplished with a primary pressure standard available from **Consolidated Electrodynamics Corp.**

Operating as an air dead-weight tester, this instrument offers the advantages of a frictionless pressure medium, extreme accuracy even at pressures of less than one psi, and portability regardless of the pressure range.

The instrument, known as Type 6-201 Primary Pressure Standard, depends on mass and length measurements for its accuracy. It will calibrate any pressure-measuring device.

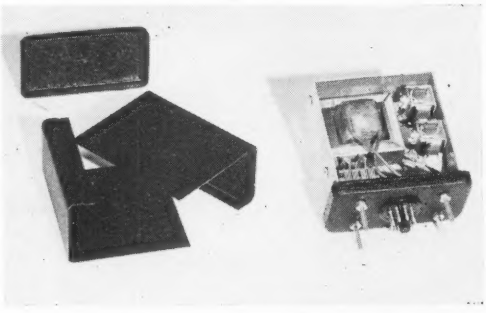
Pressure calibration is achieved by balancing controllable air pressure against the force generated by a weighted piston. When the piston is lifted and held in a suspended position by air pressure, a given pressure has been established. This same pressure, fed simultaneously to the device under test, provides the means for calibration.

The pressure medium (air) is practically frictionless. Friction between cylinder and piston is dispelled by momentarily actuating a motor clutch assembly, which starts the piston rotating. (272)

Boroscopes

The boroscope is a precision optical instrument for visual inspection of a wide variety of internal surfaces such as bores, deep holes, recesses and other inaccessible areas. As manufactured by **American Cystoscope Makers, Inc.,** the boroscope permits visualization of hidden internal surfaces in small, intricate parts through openings as small as .120 in., or inspection of large internal surfaces such as tubular heat exchangers through openings four inches in diameter and to depths of 60 ft.

The instruments have proved useful in such diverse applications as examination of aircraft engines through spark plug openings, aircraft propellers, machines and machine components, foundry castings, chemical process equipment, tools and fixtures, atomic energy installations and many other applications. The optical systems are designed to provide forward, foroblique, right angle or retrospective visual fields. (273)



Control pack

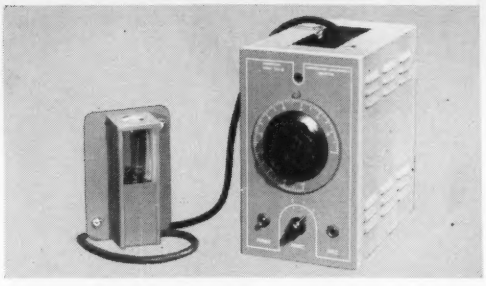
A miniaturized plug-in control pack, containing all the basic control circuitry needed for use with contact meter-relays, is announced by **Tipp-Tronic, Inc.**

Because it is unitized and takes up no more than one-fourth the space usually required for such circuitry, the control pack greatly increases the flexibility with which meter-relays may be designed into original equipment. Measuring approximately 4 in. by 2 in. by 4 in., the pack is about the size of a small camera.

Although a large number of circuit variations are available in the control pack, the standard minimum parts include an isolation transformer, a dc power supply (including rectifiers), and slave relays to provide 5-ampere ac 115-volt contacts. Frequently an interrupter or sampling circuit is also included.

The control pack is especially adapted to replacement as a unit, since the accompanying meter-relay is mounted separately. Thus a pack with different circuitry may be installed, if control requirements change, without replacing the meter-relay or associated equipment on the control chassis.

The unit plugs into standard 11-pin octal type sockets. Four mounting studs provide additional mechanical support. The pack has a completely dust-tight case that can be quickly removed. (274)

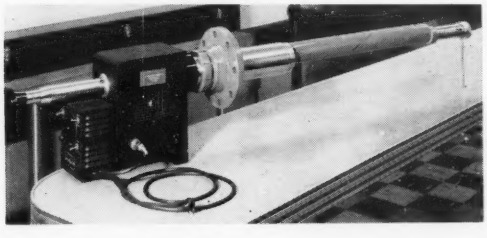


High speed stroboscope

The Model 1210-B stroboscope can be used to measure speeds from 480 rpm to 72,000 rpm without the use of submultiple frequencies which always degrade the result. A major feature of this unit, now being offered to the Canadian market by **Measurement Engineering Limited,** is the location of the light source at the end of a 4 ft cable which allows the light source to be placed in close proximity to the work. The lamp probe and cable fit into the top of the instrument. The probe handle then becomes the carrying handle for the instrument.

A resonant reed actuated by the 115-volt power line is provided to enable the user to check the calibration on 60 cycle multiples and sub-multiples. This test is accomplished by placing the probe in the cabinet and adjusting the frequency until the reed, which is visible through the porthole above the dial, appears to stand still.

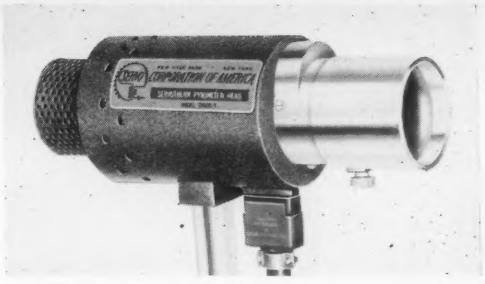
Over-all accuracy better than plus or minus 3% over long periods of time. (275)



Industrial periscopes

Industrial periscopes, precision-built instruments that can be used in many industries for the remote observation of inaccessible places and the study of hazardous processes from a safe viewing distance are illustrated and described in a published catalogue published by **Lenox Instruments Co.** represented in Canada by the Hughes-Owens Company, Ltd. Several examples are shown in the folder.

The instruments are designed to go through walls and contaminated or explosive atmospheres, around corners and under or over obstructions to permit the study and control of some phase of industrial work from a remote point. The units are said to be complete optical systems consisting of a series of lenses and prisms usually encased in a tubular unit containing various angular bends. The instrument may vary in size from that of a short quill to over 60 feet in length and provision for high pressures, temperatures and harmful radiation furnished. (276)

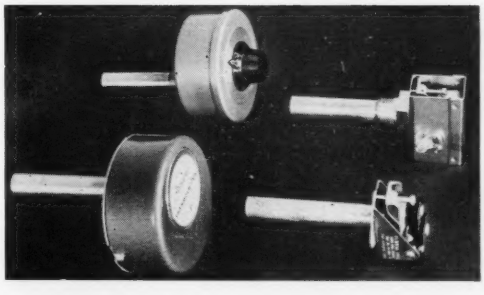


Radiation pyrometers

This Model IR-2 infrared radiation pyrometer, manufactured by **Servo Corporation of America,** aids automation on the process line. The system speedily detects, accurately reports and controls temperature variations from a remote distance, without interrupting the process.

The system consists of a power supply, an amplifier, a pyrometer head, a tripod and connecting cables. The equipment indicates temperature variations under 0.05 C and covers a temperature range from 50 C to 1,300 C. Its response time is 250 milliseconds.

Practical applications include: measurement and control of fast-moving continuous process products such as plastics or textiles; measurement and control of high-speed rotating members such as brake drums or bearings; measurement and control of heat-cured assembly-line products such as ceramics or armatures; measurement and control of hot spots such as furnaces or induction heating. (277)



Thermostats

For accurate temperature control and overheat detection at heavy electrical loads of up to 20 amp, **Fenwal Inc.** has developed a new series of local-bulb snap action thermostats. To fit the operating conditions and mounting requirements for his individual application, the user can specify thermostat features using the building-block principle.

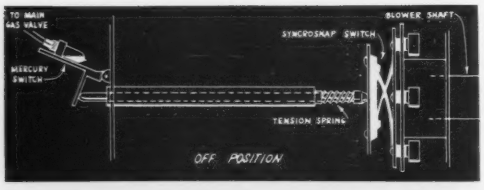
This line of Thermoswitch units, called the 20,000 series, is designed for low-cost, accurate temperature control (within 3 deg F) or heat detection. It comes in many combinations of head styles and mounting arrangements for use in gases, liquids or solids in many types of equipment.

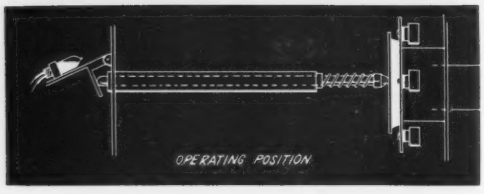
Starting with the basic heat sensing unit (a bellows assembly and rod linkage enclosed in a liquid filled cylindrical housing), the user can choose from among four basic thermostat features and several special modifications, to give him a thermostat precisely suited to his application. (278)

Mill contactors

Type 260 contactors, designed specifically for the extremely rugged and heavy duty requirements of steel mills, assure efficient, reliable performance on rolling mill controls, mill auxiliaries, cranes, hoists and related equipment.

A product of **Allis-Chalmers,** the contactors feature a combination of thermal convection and magnetic action which is utilized in an arc centring blowout to stretch and cool the arc. Because the arc is extinguished rapidly and is centred in the chute, burning and pitting of contacts and carbonization of chute walls are greatly reduced. (279)





Centrifugal switch

The Syncro-Snap centrifugal switch has been specified as the method for protecting gas furnace burners against blower failure. If blower speed falls below normal, the centrifugal switch actuates controls which immediately shut off the gas flow.

The switch, product of **Torq Engineered Products Co.,** is mounted on the blower shaft and operates in conjunction with a mercury switch assembly. In this case it is accurate to $\pm 3\%$ of the blower rpm, the manufacturer claims, and operates on speed alone, independently of voltage, load or heat conditions.

This centrifugal switch operates on a fundamentally new, frictionless, snap action principle that eliminates all wear associated with fly-ball-spring-pivot governors. In addition, the switch provides a uniform operation in excess of 1,000,000 cycles. (280)

Electric valve actuator

An all-electric valve actuator for use in conjunction with modern proportional position electronic control systems is announced by **Conoflow Corporation.** Known as the series D valve actuator, it combines the features of an all-electric system with the mechanical simplicity and ruggedness of commercial pneumatic actuators, and eliminates the use of intermediate pneumatic or hydraulic fluids.

It utilizes a rising stem movement instead of a crank arm, and comes equipped with a mounting yoke similar to those used in cylinder-type pneumatic actuators, affording easy mounting on any sliding stem valve body. (281)

Gasket thermocouples

A larger selection of miniature gasket-type thermocouples is offered by thermocouples **Thermo Electric (Canada) Ltd.** The line includes a wider choice of gasket sizes, thermocouple leads and lead terminals to meet the expanded field of gasket thermocouple application. Designed originally for use beneath spark plugs of internal combustion engines, gasket thermocouples are now used extensively to measure skin temperatures in chemical and food processing, metal working, atomic energy and many other industries.

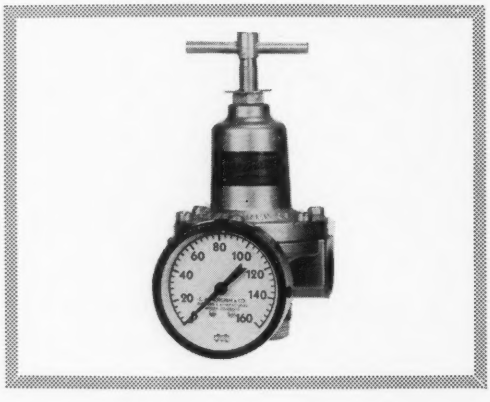
In application, a gasket thermocouple is locked in place on a stud or bolt located in the area of desired temperature measurement or control—and the entire assembly covered with thermal insulation. (282)

Step switch

A heavy duty step switch for industrial application is now available from **Davis Automatic Controls Ltd.**

This MT series switch carries contact ratings of 10 amperes. The rotary solenoid actuating coil operates directly on 115 volt, 60 cycle current without the use of rectifiers.

The switch is available with one to twenty independent circuits. Independent cam-operated contacts make it possible to set up any given application. Use of this device simplifies circuits and in many cases, eliminates the use of auxiliary relays and other electrical components. It provides a positive interlock between sequence operations on one or more machines, on conveyor systems and batch mixing. (283)



Pressure regulators

Important advancements in compressed air pressure control to improve the performance of air-operated equipment are now offered in a line of Norgren pressure regulators announced by the **C. A. Norgren Co.**

A finer degree of accuracy in air pressure regulation is now available in the series 20AG and 20AG-X regulators. Their more precise control extends over their full operating range, too, regardless of wide fluctuations in main line air pressure and widely-varying air flow. Greater air capacity is another advancement in the line.

Among the new design features offered to increase the performance and reduce the maintenance of air-powered equipment are: larger air passages; balanced valve construction, improved siphon tube action; greater effective diaphragm area; more accurate relief feature; hand-removable bottom plug for easier maintenance.

The regulators are also designed for use with water, oil and non-corrosive gases. They are available in pipe sizes from ¼ in. through 1 in. Two styles are offered: relieving-type (20AG-X) and non-relieving type (20AG). (284)

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SECTION F

Machine tools

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Wire stripper ..... (395)

Vertical broaching machine .... (396)

Boring tools ..... (397)

Microhoning machine ..... (398)

Punch Press

The Model BD-3 three ton power bench type deep throat punch press, a product of **Alva Allen Industries,** is of special design for small tonnage operations requiring large throat space. Many operations can be performed on it which previously required a much larger press due to the throat requirement. Investment savings are large and less maintenance is required.

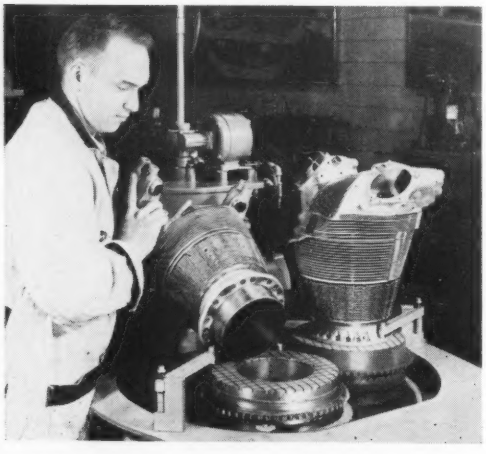
The press will perform up to 300 operations per minute on continuous punching, forming, blanking, cutting, drawing, shearing and riveting in metal, leather, plastics, fibre, textile, paper or any workable material within rated capacity.

The press features a quick action, single pin clutch with simple, positive, nonrepeat or repeat action. All contact parts are scientifically heat-treated for maximum life. Straight ram guides with flat gib assure accurate fitting of dies for precision stamping. Accurate ram adjustment has positive lock. (285)

Burr-Master machine

A special two-station Burr-Master machine for the functional chamfering of hidden holes is announced by **Modern Industrial Engineering Company.** Workholding fixtures, are of necessity, custom tailored, but the machining concept itself is applicable to many similar automotive and aircraft parts.

As set up for an automotive-parts producer, the new machine countersinks 20 blind holes on an internal diameter of a stator-blade piston for an automatic transmission. Functional chamfering was necessary to permit clearance for operation of a gate-like mechanical valve in each hole. Parts are semiautomatically positioned on the work spindle and wedged, then manually clamped. Central and radial locations of workpiece are taken from predrilled holes. (286)



Lapping machine

New tooling on the lapmaster product lapping machine is now available for precision mechanical lapping the flanged faces of radial engine cylinder heads. The tooling was designed to provide an improved method over present hand lapping. It is manufactured by **Crane Packing Ltd.**

Special combination lapping and conditioning rings which are serrated on both faces replace the standard conditioning rings on the lap plate of the machine. The cylinder heads are then set down into the special rings until the flanged face is in contact with the lapping surface of the ring.

When the machine is running, these rings are driven from a gear in the lap plate drive shaft, thereby creating a lapping action on the flanged face since the cylinder is held in a fixed position by a simple holding fixture. At the same time the regular lap plate is truing the under side of the special rings.

Thus when the working surface of the ring then doing the lapping on the flange, gets out of flat, they are simply turned over to provide a new completely flat working surface. A flat lapping surface is always available in this lapping procedure to materially reduce lapping time by at least one third. (287)

Surface broacher

A ram press machine for surface broaching has been made more productive with a new indexing table developed by **Colonial Broach and Machine Co.**

The table uses a 180 degree index and is manually fed and automatically unloaded. It features self-locking of the fixtures by the indexing action.

Set up for a manufacturer of automotive hardware, the new machine with built-in index broaches 1,200 rocker arm assemblies an hour. These parts are loaded two at a time, automatically clamped, double broached in one pass, and automatically ejected. (288)

Rotary table

A 12 in. rotary table designed for simplification of circular and rotary machining operations of all kinds is announced by the **Universal Vise and Tool Company.** Featuring a base following both horizontal and vertical operation. The table incorporates a ground lead screw. The main bearing is bronze. Centre-hole run out is guaranteed to be no more than .0005 in. and parallelism through 360 degrees of rotation is guaranteed to .0001 in. All flat working surfaces are ground true and square and the table rotates on a scraped flat bed. (289)

Straight-shank end mills

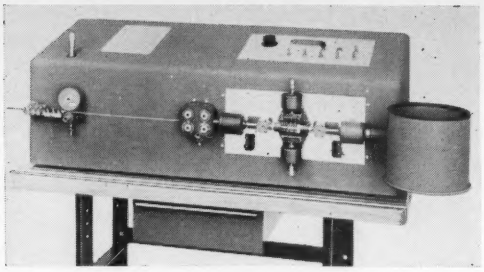
A self-gauging design that minimizes grinding time plus quick-change diameter adjustments are features of a series of inserted carbide tipped blade straight shank end mills. Standardized specifically for high-performance milling of aluminum and light metal alloys, 9 different sizes are available from **Goddard & Goddard Company.**

Blades are stocked for fast delivery. These are held securely in the cutter bodies by replaceable serrated wedges. For quick adjustment, cutter diameters can be increased in 1/32 in. increments by setting the blades one serration. (290)

Plastic molding machine

A variety of small molded plastic products can now be developed and produced more easily and more quickly and with major cost-savings, by the line of improved Mini-Jestor plastic injection molding machines announced by **Newbury Industries.** The machine features a special operating principle incorporating small, inexpensive parting-line sprued molds of 1/3 oz. to 1 oz. capacity.

It is possible to develop the product and mold any quantity, dozens to thousands, in exact design and color desired for market tests and experimental purposes before tooling up for full production. In many cases, the machine will also handle the entire production requirements. It will mold any thermoplastic, including nylon. (291)

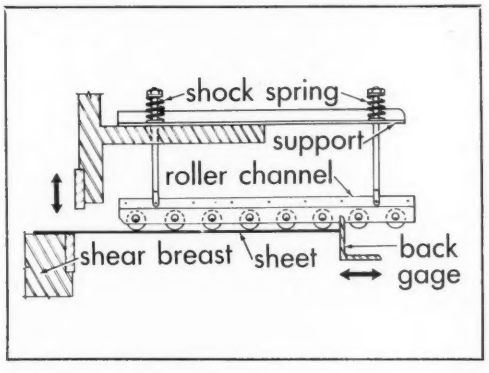


Wire cutter

An automatic wire cutting and stripping machine, with features designed to meet specific needs of the electronics industry, has been announced by the **Eubanks Engineering Co.**

The machine, Model 810, is designed to cut single conductor, solid or stranded wire from 32 ga. to 12 ga. in lengths of from 1 in. to 300 in. and to remove the insulation from one or both ends without scraping or cutting strands. The strip lengths may be varied from ⅛ in. to 1 in. Wire travels through the machine at speeds up to 150 ft. per minute, with split-second stops for cutting and stripping. Production rates at top speed range from approximately 350 300-in. pieces per hour to more than 8,000 1-in. pieces per hour.

The machine is capable of producing accurate lengths and clean strips at a high rate of speed and of standing up under high-volume operation with a minimum of maintenance. It can be used economically for short runs of from four or five to 100 wires. (292)

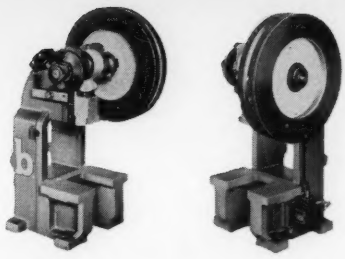


Magnetic roller channels

A new line of magnetic roller channels, reputed to expedite shearing of light and medium weight sheet steel as heavy as 14 gauge, is announced by **Magni-Power Company.**

The roller channels are easily installed on any shear, behind the breast and above the back gauge. As the sheet to be cut is fed through the shear, the magnetic rollers seize and guide it into position against the back gauge. The rollers, turning free in the channels, are said to offer no resistance to the movement of the sheet. Actuation of the shear peels the sheet off the magnetic rollers and allows the sheared material to drop free.

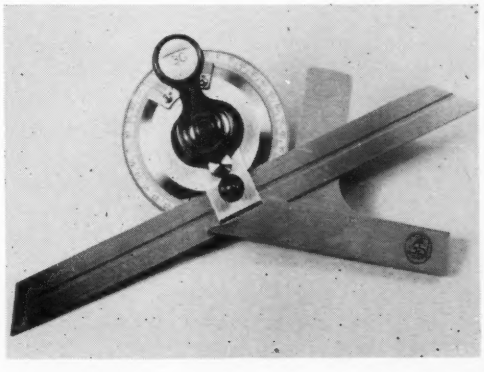
Use of roller channels results in faster, safer and lower cost shearing. The device prevents delays caused by sagging of sheets. (293)



Special purpose press

This two-ton fixed bed gap frame press, especially designed for a manufacturer of electronic components by **Benchmaster Manufacturing Company,** has several special features and is now furnished as a stock model. It is equipped with a mechanical clutch which is actuated by an electric solenoid. On the left end of the spindle is a positive, single-revolution stop and two cam operated micro switches which prevent the electrical system from double tripping. The stopping device consists of a crankshaft-mounted disc notched on its periphery for a spring loaded pawl. When the pawl engages, the crankshaft stops 3/32 in. past top dead centre. Ram location at stop position is held to top dead centre, with an accuracy of +1/64 in. - 0 in.

Special ears on the ram are drilled for bolting ram to die set. Tolerances throughout are refined to insure complete interchangeability of all tooling developed for the press. This Benchmaster operates at 280 to 290 strokes per minute, has a 5⅛-in. die space (ram up), a standard stroke of ¾ in. (294)



Bevel protractor

The problem of reading a bevel protractor easily and accurately has been solved by the **George Scherr Company** by adding an adjustable magnifier to their Universal Vernier bevel protractor.

It is made of special chrome steel, with clearly defined lines of graduation, deep enough to assure maximum service. To make reading even easier, the protractor can be furnished with an adjustable magnifier mounted over the scales.

The tool will measure any angle to 5 minutes, and comes regularly equipped with a 6 in. blade. Also available are 12 in. blades, acute angle attachments for measuring of small angles, and a stand with precision lapped base to set up on shafts as well as on flat surfaces. The scales on the dial are chrome finished to facilitate taking of readings. (295)

Router

The Model 150 router introduced by **Porter-Cable Power Tools Ltd.,** features trigger-switch power control, light-weight ease of operation and a power unit designed to be interchangeable with a planing attachment and shaper table. A convenient handle allows greater control of the router in any position, assuring operational safety and accuracy.

Furniture makers, builders and carpenters will find the 150 useful. Over 150 bits and cutters can be used to achieve such effects as veining, fluting, compound molding, reeding and beveling. (296)

Air gauge

A 21-column Precisionaire gauge, which is one of four now being used by a major automobile transmission manufacturer to inspect 21 dimensions and conditions on an aluminum transmission case, is announced by **The Sheffield Corporation.** The operator regularly checks between 50 and 55 cases per hour.

This multidimension air gauge checks six internal diameters, two lengths, three parallelisms, four combination squareness and concentricities, five flatness, and one pan face to dowel location dimension in a single handling of the part.

To use, the operator places the part on a stationary gauging spindle having five different size gauging diameters along its length, locks the part in position with quick-action hand clamps, and inserts a hand-type air gauge spindle into the top of the part. Next, he rotates the part about the spindle 350 degrees to check concentricity of the diameters with centreline. Flatness of the pan face is gauged at five places by means of five Plunjet gauge cartridges mounted in the tapered face of the gauging arm, airdraulic operated. Float positions in the gauge show whether each dimension or condition is within tolerance or the amount of out of tolerance. (297)

Metal cutter

For metal-cutting operations which involve bolts, wire, rods, chain, bars, strap stock, wire rope, cable and reinforcing rods, especially at work-stations where these operations are frequent or repetitive, the heavy-duty cutter of **H. K. Porter, Inc.,** is efficient and labor-saving. Made in two sizes, No. 1 and No. 3, and with a variety of jaws for specific materials to be cut, it can be attached to bench, floor, machine, truck, wherever the cutting job is to be done. (298)

Surface grinder

The addition of a 6 in. by 18 in. precision surface grinder to their range of machine tool products is announced by **Ex-Cell-O Corporation** of Canada Limited.

The grinder, Style 618, has table speeds adjustable between 12 ft. and 35 ft. per minute. Maximum stroke is 20 in., cross feed stroke is 6½ in., adjustable in increments of .010 in. to .115 in. The permanently lubricated spindle is rated 1 hp at 3,600 rpm.

The main base and spindle column of this Canadian-made machine are rugged one-piece, stress relieved castings for greatest rigidity. (299)

Small-gear hobber

A new hobber, Model 1433 has been designed by **Michigan Tool Company.** The 1433 represents a new concept which lends itself to easy adaptability to any degree of automation. Using a common sub-base, the machines can be set up in tandem of unlimited series with automatic through-feeding and removal of parts. Gear washers and gear classifiers can be easily integrated into the machine units. Automatic size control is also provided. All machine services are self-contained in the sub-base.

The machine will hob up to 12-pitch spur gears or helical gears. Maximum centre distance from hob arbor to work spindle is 3¼ in. Maximum crossfeed stroke of hob is 4 in. Either right or left hand helix angles up to 30 degrees can be hobbed.

In operation, the hob is plunge fed into the work, eliminating the approach feed for a substantial reduction in hobbing time. The hob is then fed across the work, the stroke being adjustable. (300)

Bench-model comparators

Skilled and unskilled inspection people can instantly determine the precision of parts with the bench comparator available from **Jerpbak-Bayless Company.**

Similar to the hand models produced by the company, the bench type permits the interchanging of various tooling from one model to the other. It checks pitch diameter on splines and gears both externally and internally, length of parts, shoulder distances, centre to centre, O.D and I.D. dimensions.

Entire parts or any portion of them are easily inspected by holding the checking area between the two adjustable contact points. (301)

Cool grinding attachment

Featuring an improved compact design which enables the entire unit to be located on the grinder, a new cool grinding attachment has been developed by **Reid Brothers Company, Inc.**

Air is supplied from the shop air system by attaching a hose to the snap-on air connection at the rear of the unit. Coolant is stored in a 2½ gallon vertical, rectangular tank, positioned on the side of the grinder head column.

Component parts on the air line consist of a water-filter trap to remove any oil or dirt that may be present in the shop air system, a diaphragm-type pressure regulating valve and an air gauge, on the outlet of the valve, indicating the amount of air pressure being applied. (302)

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SECTION G

Materials - metallic

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Flux-coated bronze ..... (304)

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Name plate ..... (306)

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Dip brazing for aluminum ..... (324)

Special stainless steel ..... (325)

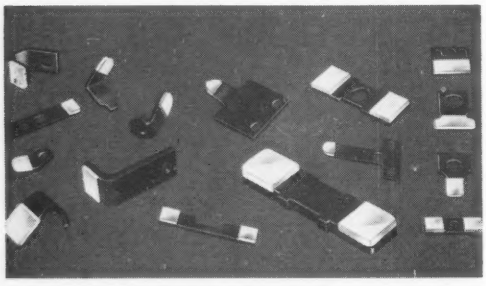
Shredded metal packing ..... (326)

Stan steel tubing

The facts about Stan Steel electric welded tubing are presented in a handbook which is available from **Standard Tube and T. I. Ltd.** Possessing many important inherent characteristics, it comes in many sizes, shapes and wall thicknesses. It can be worked by various processes into many useful parts. (303)

Flux-coated bronze

A flux-coated bronze rod for welding bronze and brass, and for braze welding cast iron and steel, is announced by **National Cylinder Gas Company.** By eliminating hand fluxing, the new rod will cut welding time and will reduce gas consumption and improve the quality of the welds. Called Redifluxed Bronze No. 30, it is an all-purpose, low fuming bronze which melts at 1625F and has good tinning qualities. (304)



Oxide top-lay contacts

Silver-cadmium oxide top-lay contacts are available in fabricated parts and strip form at the General Plate Division of **Metals & Controls Corporation.**

Cold-working, proper base metal temper, and the dense, hard, silver-cadmium oxide contact facing provide long electrical and mechanical life and the ability to withstand the stress and wear developed by repeated operations.

Added advantages are complete freedom from the annealing of the mounting supports, inherent in brazing assemblies; no contamination of the contact surface and unusual weight savings.

Silver-cadmium oxide top-lay is available in clad strip widths of 1/16 in. to 4½ in. and in base metal thickness from less than .010 in. to .250 in. or more. It can be combined with practically any rollable or malleable metal in top-lay strip or contact form. (305)

Name plate

An economical name plate has been developed by the **E.C.P. Corporation** for identifying such control panel components as relays, starters, and timers. They may also be used to identify motors, limit switches, and terminal boxes. The plates may be had in either fibre or aluminum. Special adhesive on the back of each plate markes application quick and easy. (306)

Pre-sensitized plates

A range of pre-sensitized positive paper and positive metal plates for use on all popular makes of offset printing machines up to 14½ in. by 17¾ in. printing area has been introduced by the **Rotaprint Company of Canada Limited.**

The facility of being able to expose these plates in any standard exposure device (including carbon arc and white or blue printing equipment) from transparent or translucent originals, is of interest to engineering and drafting fields.

Providing no reduction is required, the existing original, whether it be on tracing linen, vellum or paper, can be fed with the plate, directly into a continuous printer at normal printing speeds and dozens, or hundreds of copies can be produced on any variety of stock in minutes. (307)

Hardsurfacing flux

An addition to its line of hardsurfacing agglomerated alloy fluxes is announced by **Lincoln Electric Company.** The flux, H-560, is used with the submerged arc welding process to produce a hardsurfacing deposit using a mild steel electrode. It is good for the fabrication and maintenance of wearing parts where the service involves severe abrasion and medium impact. (308)

Nionel alloy

The latest addition to the group of high-nickel Inco alloys, Nionel has been developed by **The International Nickel Company, Inc.** to handle certain corrosive conditions of unusual severity. It has the specific ability to withstand certain hot acids and oxidizing chemicals, and has high resistance to other conditions. (309)

Solder resist

A solder resist which permits selective soldering, minimizes bridging over close tolerances, and reduces solder waste has been developed for printed circuits. It is manufactured by **London Chemical Company, Inc.** Known as PC #33, it is an organic coating which affords high insulating resistance across the circuit pattern. It has a low temperature cure of 200F, and requires a cure time of only 20 to 30 minutes. (310)

Fansteel 77 Metal

For maximum density in limited space, Fansteel 77 metal is recommended by **Fansteel Metallurgical Corporation.** It is twice as heavy as steel and 50% heavier than lead. It has high tensile strength, and high modulus of rupture. It machines like cast iron, with fine finishes and close tolerances. It is economical because it is made by powder metallurgy; therefore there are no large scrap losses.

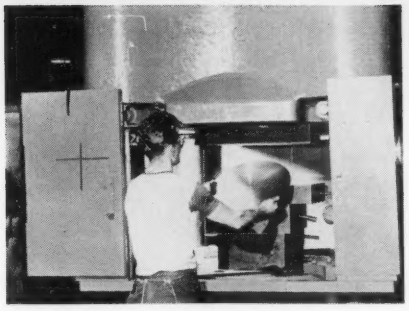
An important use of the metal is for counterweights in the ailerons of several aircraft. (311)

Indium

One of the most recent newcomers to the family of metal products is the metal, indium. It is being used increasingly as a semiconductor metal in the manufacture of transistors. The purity of indium when used for this purpose is very important. Two grades of indium for this industry are offered by **The Consolidated Mining and Smelting Company** of Canada Ltd. Tadanac Standard grade indium is 99.97% pure, and Tadanac high purity indium is approximately 99.999% pure. (312)

Titanium wire cloth

Development of corrosion-resistant titanium wire cloth on a production basis is announced by **Cambridge Wire Cloth Company.** First used by the chemical processing industry, the new titanium product is finding applications in filtering assemblies, catalysts and screens. Its use is also being investigated in the paper industry, and in medical research. (313)



Plastic steel

Devcon plastic steel is a combination of 80% steel and 20% plastic. This product is made by **Devcon Corporation** and is as easy to use as modeling clay. Two hours after the addition of a special hardening agent, the mixture becomes a rigid, steel-like mass. Once hard, it can be sawed, drilled, threaded or ground with regular metal working tools.

The material was developed originally for use by the metal working industry for making tools, jigs, fixtures, molds and dies. It has been found that it has good adhesive qualities for metals and can be used for bonding steel, iron, bronze, brass, aluminum and lead to themselves, to each other, or to many other materials.

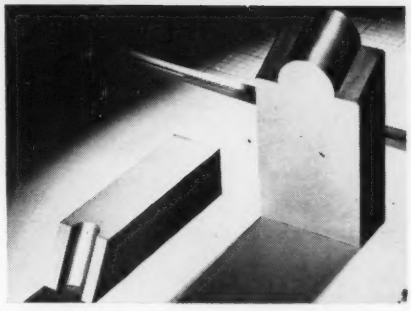
It is now being used for rebuilding broken machinery, filling large and small holes in castings, building up worn surfaces on machine tools, and repairing stripped threads. Two types are available: one is a putty, and the other is a viscous liquid. (314)

Magnetic flexible forms

A flexible ferromagnetic plastic, trademarked Ferrotron, is offered in sample kits from **Polypenco, Incorporated.** This iron powder product is in rod and tape form. Rod diameter sizes are ⅛ in., 3/32 in. and ¼ in. The tape is ½ in. wide and stocked in thicknesses of 4, 8, 16 and 32 thousandths of an inch.

Not a magnetic recording tape, this product is as flexible as paper and yet has dielectric strength, constant magnetic permeability over a wide range of frequencies, and has good moisture and temperature resistance.

Miniaturization of components is a possibility in using flexible forms, since they permit design essentially within a magnetic atmosphere. Using Ferrotron Type 309 tape in a coil structure, a government research activity reduced the component's weight to 25% and its size to 15% of the original coil performing the same function. (315)

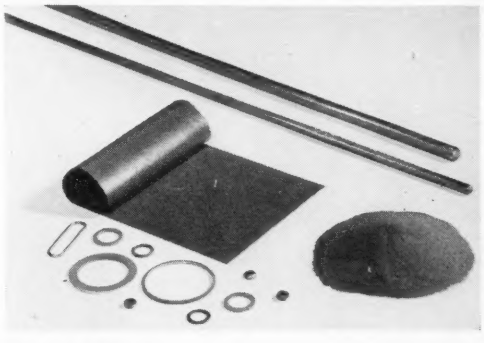


Tool steel

Better machinability and better finish are the advantages offered in a new tool steel produced by **Allegheny Ludlum Steel Corporation.** Called Oilgraph-EZ, the improved combination of properties is achieved by addition of a small amount of sulphur (0.10%) to the analysis of the steel.

By adding a .10% sulphur to Oilgraph-EZ, which has a graphite range of from .20% to .40%, the graphite and sulphur act the same as if this range were .50 to .70% graphite. This makes the steel easy to machine, and at the same time retains its good finishing characteristics. The sulphur and graphite particles act as a continual and constant lubricant while the machining is taking place.

The steel has been used successfully for drill jig bushings of small diameter and for carbon steel taps. Other applications include gauges, punches, dies for forming, blanking, trimming, and shanks for carbide tools. (316)



Brazing alloys

Four high-nickel content brazing alloys, called Handy Hi-Temp alloys, are offered by **Handy & Harman of Canada Ltd.** The alloys are particularly useful for brazing austenitic stainless steel, high-nickel heat-resistant and precipitation-hardening alloys.

They will also braze carbon steel and non-ferrous metals having melting points above 1850F. Applications include joining high-temperature resistant parts for jet engines and rocket motors, honeycomb structures, heat exchangers, and corrosion-resistant equipment for food, dairy and chemical processes.

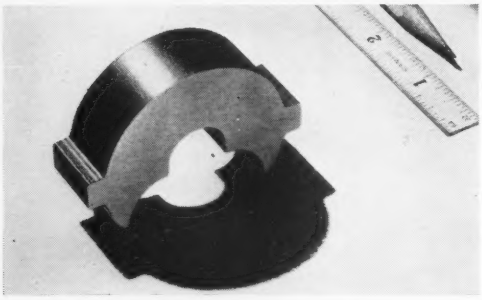
All the alloys are available as cast rod, powder, resin-bonded sheet, as well as in forms fabricated and sintered from the powder. They are self-fluxing when used in a controlled atmosphere of dry hydrogen (dewpoint of —60F or better), argon or helium. Standard brazing furnaces and salt baths operating at about 2150F may be used for brazing. (317)

Aluminum alloy

Frontier 40-E aluminum alloy is a high strength, natural aging aluminum-zinc-magnesium-chromium-titanium alloy. It is made by **Frontier Bronze Corporation.** Heretofore, industry depended upon solution heat-treatment for high strength in aluminum alloys. This alloy requires no heat treatment to develop high strength, has considerable shock resistance, excellent machinability, and, because of its fine grain structure, pressure tightness. (318)

Engineering handbook

The manufacture and use of powdered metal parts as revealed by experience and comprehensive research are described in detail in An Engineering Handbook on Powder Metallurgy, issued by **The Bunting Brass and Bronze Company.** The design, engineering and application of bearings, machine parts, infiltrated parts, plated parts, and pole pieces made of powdered sintered metal are discussed. (319)



Carbon steel

An unusual steel extrusion that is increasing the functional reliability of a new field weapon and, in addition, effecting a 50% savings in fabricating costs is being produced by **Allegheny Ludlum Steel Corp.**

The pictured shape is made of SAE 4340 carbon steel as extruded and is bolt carrier stock for an experimental field weapon.

Previously, the bolt carrier was machined from hot rolled bar stock. The two side lugs were made by end milling the slots and then precision brazing the lugs into place. By having the lugs an integral part of the bolt carrier, as in the extruded piece, reliability of the weapon is improved. (320)

Cast iron

Just released: a 57-page manual on the machining and grinding of gray and nodular (ductile) cast irons.

Authored by Norman Zlatin and Charles F. Walton, Technical Director, **Gray Iron Founders' Society,** the manual is intended for use in the design, engineering and production of cast components.

Part 1 (Machining) includes chapters on the selection of tool materials, grinding cutting tools, machining applications, machining properties of iron castings, economics of machining and general machining recommendations. Part II (abrasive finishing) covers types of finish grinding, honing and lapping.

Abundantly illustrated and including numerous commercial and practical examples, it constitutes a real down-to-earth and ready reference on machining and abrasive finishing. The manual presents recommended practice for feeds and speeds as well as tooling. Machinability data are given for the various types of iron related to microstructure. (321)

Magnetic properties of ferrite materials

Catalog sheets available from **General Ceramics Corporation** describes the magnetic properties of three types of ferrite materials produced by that firm. Designated Ferramic "O-2", Ferramic "Q" and Ferramic "H", these ferrites are used as component parts in radio and TV sets, computers, automatic controls and related electronic equipment.

Pertinent information is contained in tables and graphs. Photographs are included. (322)

Alloys for brazing electronic components

Special vacuum-tube grade silver and gold brazing alloys are available in production quantities from **Handy & Harman,** manufacturer of brazing alloys. These alloys are designed specifically for brazing electronic components in which the concentrations of metallic impurities must be kept to an absolute minimum.

The types of alloys being offered in the vacuum-tube grade are described in table HA-198. These alloys are carbon free and meet all applicable industry specifications on maximum content of cadmium, zinc and other volatile elements not allowable for vacuum-tube work. They are supplied in wire, strip and sheet form. (323)

Dip brazing for aluminum

Bulletin 23, recently published by **Handy & Harman,** describes Alumibraze, an alloy in a form that offers an improved method for joining aluminum parts. The four-page bulletin gives step-by-step details on dip brazing with the new powdered aluminum-silicon alloy, which is applied to the joint in the form of a paste. The bulletin also describes design techniques, fixturing arrangements and salt-bath requirements to produce strong, dependable joints in various aluminum alloys. (324)

Special stainless steel

A blue technical data sheet on a special stainless steel that is used for jet engine parts is now available from **Allegheny Ludlum Steel Corp.**

Technical data including physical and mechanical properties, resistance to corrosion and oxidation are included. Type 418 special is recommended for application in the 750 to 1100 deg. F. range. (325)

Shredded metal packings

The **Garlock Packing Company** is now offering shredded metal packings known as Styles 934 and 935 for use under extremely high steam pressure and temperatures. Both styles are made of copper tinsel, treated with special rubber cements, graphited throughout, molded to shape and cut open with a beveled joint.

Style 934 is offered in ring form only, usually molded to approximately a square cross section and bevel cut, while Style 935 is a packing set consisting of conical shaped molded center rings with 120° included angle and bronze top and bottom adapters. Other metal adapters are available to customer's specifications with a different degree of bevel, as center rings only without adapters, of Style 935 stock.

Both styles are recommended against steam, air, water or gases (except ammonia) on valve stems, reciprocating rods, and rotary shafts of pumps, blowers, turbines and compressors. (326)

SECTION H

Materials - non-metallic

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Nafil polyurethane foams ..... (330)
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Polyethylene closures ..... (334)
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Teflon tapes ..... (350)
Nylaflow tubing ..... (351)
Vibrin F-4 shellcoating ..... (352)
Phenolics ..... (413)

Thin-walled tubing

Teflon thin-walled tubing is the subject of a new bulletin issued by **Haveg Industries, Inc.** The tubing is used in electronics as sheathing for cables, slip-on and sleeving insulation in motors, generators and transformers. It is also used as instrument wiring for automotive, aviation, communication and marine equipment. (327)

Carbon well zone lining

Carbon is now widely used for lining the cupola well zone. It offers savings in operating and maintenance costs where corrosive slags have been a problem. Its greatly prolonged life permits operation of the cupola for extended periods without dropping the bottom doors for repairs. It forms a chemically neutral lining, which allows greater flexibility in metallurgical practice. Carbon products are made by **National Carbon Company.** (328)

Firebrick bulletin

Firebrick, high alumina and special Corindon brick, products of **J. H. France Refractories Co.,** are described in Bulletin 551. General industrial applications covered are boilers, incinerators, iron and steel furnaces, pulp and paper plants, nonferrous industries, oil refineries and ceramic furnaces. (329)

Nafil polyurethane foams

The development of a two component system for producing Nafil polyurethane foams that will foam, set and cure quickly without the use of external heat or pressure is announced by **Chase Chemical Corp.**

The foam, obtained by mixing nafil AR resin and HM catalyst, sets and cures much faster than standard nafil foams. It is rigid, essentially closed cell and has extremely strong, tough cell walls. Ideally suited for insulation, structural reinforcement, sound deadening and shock absorbing. (330)

Sapphire and ruby crystals

Linde synthetic white sapphire and ruby crystals, made by **Linde Air Products Company,** are used wherever resistance to wear, extreme hardness, low friction, high dielectric strength, and resistance to heat and corrosion are required. Sapphire and ruby are homogeneous, single crystals whose surfaces are free from grain, where wear could start. They are both transparent crystals, differing only in color. They can be fabricated to practically any form by cutting, grinding, and polishing, by flame-forming methods, or by bonding to other materials. (331)

Fabric batting

A new type of self-supporting batting made of nylon fibres is useful for thermal insulation, liquid and gaseous filtration, vibration and shock absorption, padding, and packing applications. Called Ny-Sul-Loft, the material is manufactured by **Star Woolen Co.** The batting has nylon's properties and, since it will withstand continuous temperatures of 300 F, it can be laminated or stitched by a process using heat treatment. (332)

Tygon tubing

Bulletin T-97 covers Tygon flexible plastic tubing and is available from **The U.S. Stoneware Co.** Applications and limitations of each of the tubing formulations are presented. The physical properties and chemical resistances based on A.S.T.M. testing methods are shown in chart and table form. (333)

Polyethylene closures

Expansion of its line of CaPlugs (polyethylene closures) to include caps and plugs in 10 different designs is announced by **Protective Closures Co., Inc.**

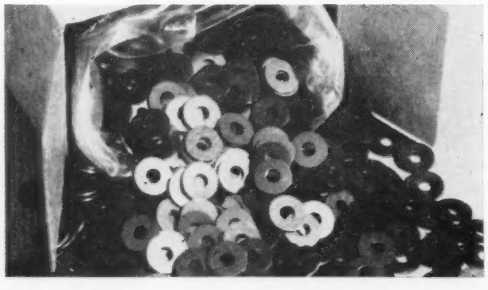
Useful as dust and moisture seals and shipping protectors for delicate fittings, valves, hydraulic components and machined parts, they also serve for masking purposes during dipping, painting and vacuum plating. Molded of tough, flexible polyethylene plastic, they are unaffected by chemical reagents, and will not chip, break or shred. (334)

Glastic channel-duct

A three-sided wiring duct for simplifying panel wiring, Glastic channel duct, is now available in a 2-in. high size as well as 3 in. size. The new size extends only two inches away from the panel. It is available from **The Glastic Corp.**

The wiring duct provides a means of lowering fabrication and assembly costs in the production of control panels. Wires are laid in the glass-reinforced polyester duct, then strung through holes to the nearest connection points before the cover strip is snapped on. The wiring duct replaces hand-formed solid wire layouts, eliminates expensive harnesses and simplifies maintenance. It is easy to shear and to mount. It does not require mitred corners.

Some additional benefits of the channel-duct include UL-recognized flame retardance to 105 C, dielectric strength of 5000 volts minimum, high impact strength, dimensional stability and superior arc resistance. (335)



Nylon washers

Nylatron GS nylon thrust washers are now available from stock from **Polypenco, Inc.** The washers are stamped from strip to outside diameters of ⅜ in. to 1 5/16 in. and inside diameters of ⅛ in. to 1 in. They are available in thicknesses of 1/64 in., 1/32 in. and 1/16 in.

These thrust washers are used in a variety of applications where the best possible wear resistance is required under light thrust conditions. A prime example is their use in fractional horsepower motors where they demonstrate long life in contact with metals. They have a low coefficient of friction and can be used to advantage where lubrication is difficult. While primarily rigid for mechanical applications, noise can be reduced measurably.

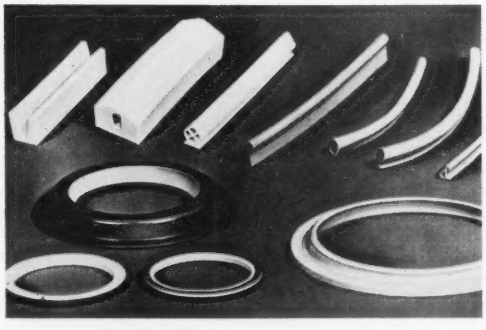
The washers are of molybdenum disulphide-filled nylon formulation which has better dimensional stability and lower deformation under load than standard nylon. (336)

Plastic liner

An epoxy base compound for use wherever non-corrosive liners are required is being manufactured by **The Homelite Corporation.** Called Coroline 347, the plastic is inert to organic acids, dilute mineral acids, to caustics, alkalines, and most solvents.

It has been used to line tanks, scrubbers, steamers, columns and ducts. It is particularly successful for use with petroleum products. It is composed of two parts which can be easily mixed at the time of application. It can be brushed or sprayed on and may be used in applying glass cloth or other fabrics.

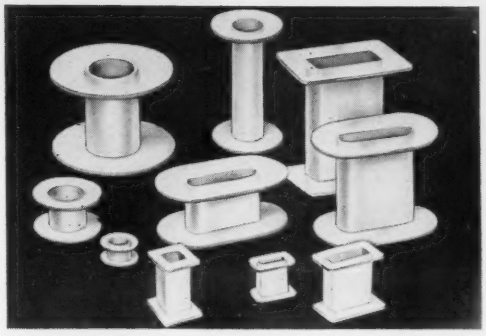
When more than one coat is needed, successive coats may be applied immediately. The plastic hardens at ambient temperatures in approximately 24 hours. It does not require high temperature cures. Applications can be checked by high voltage spark testing. (337)



Silicone rubber packing

A full selection of silicone rubber packing materials has been introduced by the **Garlock Packing Company.** Silicone rubber resists ageing, sunlight and ozone, and has a low compression set. Its ability to withstand high and low temperatures, its good dielectric properties, resistance to low swell mineral oils at high temperatures, and to a variety of chemicals, make it a good sealing material.

Some of the products include diaphragms, gasketing, sheet packing, oil seals, rings, insulation tape, and rod and valve stem packing. It is also available in sponge and in molded, extruded, die-cut and metal-bonded shapes. It withstands indefinitely continuous exposure to hot air and temperatures up to 300 F, exceeding the serviceable upper limit of other rubbers by 150 F. In most applications silicone rubbers will withstand exposure to air and temperatures from 300 F to 500 F. (338)



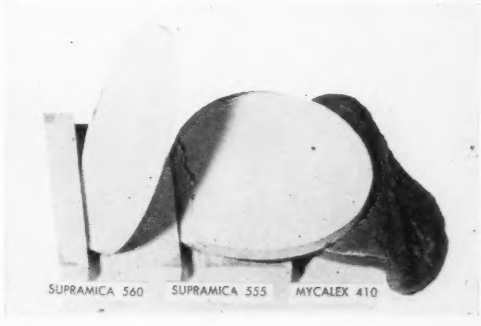
Nylon coil bobbins

Small nylon coil bobbins are being produced in a variety of sizes in round, square, rectangular and oval shapes by the **Gries Reproducer Corp.**

The one-piece construction offers advantages over 3-piece fibre or paper assembled coil forms: ease of handling and winding, no loose ends and greater rigidity.

The bobbins are used primarily in the electronic and electrical industries for transformers, solenoids, tuning coils, and in deflection, audio, reactor, relay, filter, delay and video circuits.

The end products are computor machines, hearing aids, radios, amplifiers, telephones, TV sets, timers and actuators. Sizes available are from ¼-in. diameter by ¼-in. long minimum, up to ⅞ in. Special requirements may be had on order, extra-precise tolerances, or bobbins with integral holes. (339)



Insulating material

A moldable ceramoplastic insulating material, known as Supramica 560, which will withstand continuous operating temperatures in excess of 500 C, has been announced by **Mycalex Corporation of America.**

It is a molding ceramoplastic which can be precision-molded to very close tolerances, and which is dimensionally stable during and after fabrication. Because of thermal expansion coefficients closely matching those of steel, functional or reinforcing inserts may be molded in without risk of loosening and resultant corona.

The specific gravity of the material has been reduced to 2.8, only slightly higher than that of mineral-filled alkyds and polyester glass compounds. With its lighter weight and greater thermal endurance, it shows promise in the development of high-temperature, quality components for airborne and missile applications. (340)

Reinforced plastic

A plastic resin reinforced with fiberglass has been developed by **Haveg Industries, Inc.** Said to provide complete corrosion resistance to a wider range of conditions than the best polyester resins, this new formulation, Haveg 6610, has greater impact strength, while it is just as light in weight as polyester. A range of standard and special tanks, fume ducts, hoods, towers and trays of this resin is now being made. (341)

Epoxy hardener

Sonite No. 21, an acid anhydride curing agent for epoxy resins, made by **Smooth-On Manufacturing Company,** is useful in such casting applications as potting and encapsulating of electrical components. Epoxies cured with this hardener will have a heat distortion temperature up to 400 F, good electrical and physical properties, and good fire resistance. Castings come to an initial solid state within one hour at 120 C, at which time they may be stripped from the mold and post-cured for best physical properties. (342)

Plastic foam

Sparkle-lite is a rigid polystyrene foam of high tensile and compressive strength in relation to weight. This makes it an economical packaging material. A product of **Schwab Plastic Corporation,** this type of expanded plastic is not affected by temperature and humidity changes due to the low thermal conductivity and low moisture absorbent qualities. Available in white, red, green and blue, it can be fabricated or molded in a variety of shapes and sizes. It can be used in packaging fragile items. (343)

Matrix paper

A lower-cost matrix paper, Verifax CS, which reduces the cost for one verifax copy to less than 8 cents, has been introduced by **Canadian Kodak Co., Limited.**

Designed for the large volume user with many calls for a single photocopy, the product will provide a valuable supplement for those photocopying operations which do not require the multiple copy feature of regular matrix paper. (344)

Silicone rubber

A silicone rubber that will conduct electricity without wires is now commercially available. It is Union Carbide X-1516 silicone rubber compound, a product of **Linde Air Products Company,** Division of Union Carbide Canada Ltd.

Compounded with carbon black, V-1516 is conductive and can be molded, calendered or extruded without appreciably changing its electrical properties. This is in contrast to the organic rubbers which have to be carefully handled to preserve their conductivity. The silicone rubber can be made into difficult or odd shapes. (345)

Silicone fluids — evaluation

To aid designers in evaluating various silicone fluids for specific applications, **Dow Corning Corporation** has prepared a new reference brochure describing the physical and electrical characteristics of all leading silicone fluids now commercially available.

Data in the brochure are arranged in tabular form and include such standard properties as specific gravity, pour point, thermal conductivity, surface tension, refractive index, dissipation factor, and specific heat. (346)

Cleaning solvents

Nonflammable solvents are available to meet special industrial cleaning problems. Made by **Du Pont of Canada** and marketed under the Freon trade mark, they are capable of biting into and removing oil, grease and dirt without harming delicate metal parts or electrical insulation.

Safe for use in ordinary work areas with conventional ventilating equipment, they are adaptable to vapor degreasing or cleaning by immersion. (347)

Data sheets — carbide grades

A series of 15 new Blue Data Sheets on Carmet carbide grades is now being distributed by **Allegheny Ludlum Steel Corporation.** The sheets are keyed with bands of different colors across the bottom to indicate each grade's function. A red band at the bottom indicates grades for machining steel; blue, nonferrous and cast iron materials; green, die grades and wear uses, and yellow, for chrome carbide uses. Typical applications, analysis, and physical properties are given. (348)

Epoxy maintenance coating

Protection for surfaces and finishes exposed to corrosives and to adverse weather and atmospheric conditions is afforded by two coating resins which have been added to the Maraset line of **Marblette Corp.** Grey enamel no. 750 and clear varnish no. V-760 are abrasion-resistant, resist chemicals, heat and humidity, and have good adhesion. They are applied to automobile bodies, marine and oilfilled equipment, machinery and outdoor furniture. (349)

Teflon tapes

Teflon continuous-roll tapes in thicknesses to 3/16 in. have been developed by the **Enflo Corporation.** Previously, teflon tapes were available in thicknesses to just 1/16 in., and in sheets with maximum lengths of four feet. With the new heavier tape, lengths from forty feet to several hundred feet are obtainable in thicknesses of 3/32 in., ⅛ in., 5/32 in., and 3/16 in. Maximum width varies from 6 in. to 12 in. depending upon thickness. (350)

Nylaflow tubing

Nylaflow pressure tubing, which can be used with standard metallic flare or flareless fittings, has been developed by **Polypenco, Inc.** The tubing can be used with moving surfaces or connections, is tough and resilient. It can absorb the hydraulic hammering and bumping which often damages metal tubing. It will not corrode and serves over a wide temperature range. It can be bent around corners while being installed; can be used in continuous lengths for lubrication, hydraulic pneumatic and instrumentation lines. (351)

Vibrin F-4 shellcoating

Vibrin F-4 shellcoating formulation has been developed for use in both spray and brush application. A product of **Naugatuck Chemicals,** it is a necessary tool for the fabrication of smooth, nonporous, and paintable reinforced polyester laminates. It is a pigmented resin layer which becomes chemically bonded to the laminating resin and thus cannot be peeled off or separated by high humidity, water immersion, impact or abrasion. (352)

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SECTION I

Mechanical devices

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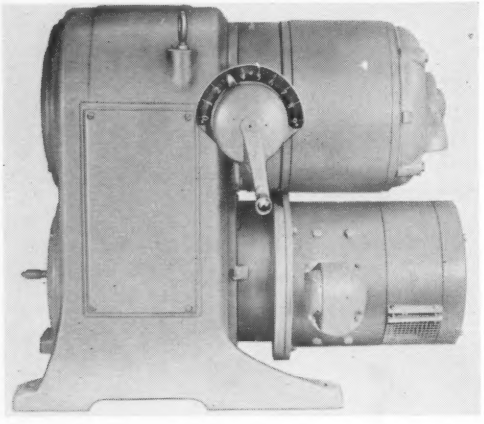
Flexible couplings

Hamilgear flexible couplings (catalogue No 116) are suited for all possible conditions of misalignment. The tooth flanks of the external teeth on the hubs are crowned to give a barrel shape. The amount of curvature is proportioned to balance the requirements of eliminating the edge tooth contact when connecting misaligned shafts, and still assure maximum load carrying capacity with minimum tooth stress. **Hamilton Gear and Machine Company** makes these couplings. (353)



Multiple drive system

The introduction of the Varidyne system provides a simple means of synchronizing variable speed, multiple drives. Employing alternating current devices throughout, the system gears all the drives together by means of electrical impulses. Synchronization is inherent, eliminating the need for control loops and balancing networks.

The system is a product of **U. S. Electrical Motors Inc.** The Varidyne final drive motors, of the ac squirrel-cage induction motor type, are connected to the Varidyne power unit by means of standard 3-phase circuitry. The speeds are adjusted from one location and speed changes are instantaneous and simultaneous. No lead motor is needed.

For applications where two or more conveyors or machines must be "link" synchronized, Varidyne synchronous motors can be provided. Because these motors are somewhat larger than induction type motors for a given rating, they are used only where absolute synchronism is required. (350)

Precision spring clutches

Two over-running clutches, Series OB ball-bearing type and Series PB sleeve bearing type, have been developed by **Curtiss-Wright Corporation.** The ball bearing clutches are designed for 20 to 3,000 lb-ft torque capacity and shaft sizes of ⅜ to 3 in. The sleeve bearing clutches are in the 20 to 100 lb-in. torque range, for shafts of 3/16 in. to ⅜ in. (355)

Friction clutch

The friction clutch unit provides clutch action only at a predetermined torque. Manufactured by **Servo Corporation of America,** it consists of a split shaft, slip clutch assembly, and friction adjusting nut with lock. The amount of friction between the clutch faces is set by the adjusting nut. When the input shaft torque exceeds the limit, the clutch slips so that the output cannot pass the desired value. The clutch can be set to slip at any torque from 2 in. oz for minimal settings to 20 in. oz for maximum friction. (356)

Semi-trailer

A winchless, non-hydraulic removable goose-neck semi-trailer has been announced by the **Fruehauf Trailer Company of Canada Ltd.** For fast and easy front-end loading of heavy equipment it saves time and labor. It is available on all Fruehauf Carryalls up to and including 50 tons. For loads over 50 tons, a winch assist is recommended. (357)

Alnico magnets

Alnico permanent magnets are now being manufactured in the plant of **The Indiana Steel Products Company of Canada Limited.** Stocks of standard magnets in a wide variety of shapes and sizes are available for immediate shipment. (358)

Speed reducers

The availability of a catalogue covering its recently introduced line of shaft-mounted Screw-King speed reducers is announced by **The American Pulley Company.** Selection of drives for screw conveyors is a simple matter. By following directions and using the tables, a complete drive can be designed in a matter of minutes. (359)

Renold chains

The latest data for the specification, purchase and applications of chains and accessories is provided in a catalogue, Ref. 116/100, issued by **Renold Chains Canada Ltd.** New items include additions to the range of A.S.A. roller chains; adaptations of transmission chains for conveying, and operating mechanisms. (360)

Quick-disconnect strip terminals

The full line of Fingrip quick-disconnect strip terminals is described in a bulletin issued by **Burndy Canada Limited.** Male, female, and right angle terminals are detailed for wiring applications in stoves, oil burners, switches, fans, timers and electrical appliances. (361)

Motor compressors—condensing units

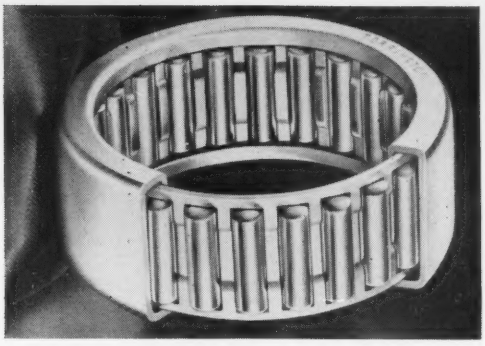
Motor compressors and condensing units are now available in the 440-volt, three phase range, from **Brunner Corporation.** Semi-hermetic motor compressors in 1½, 2 and 3 hp for 440 volt applications in high, low and commercial temperature ranges have been introduced. Request Bulletin G-148. (362)

Dexion slotted angle

Two new sizes of Dexion slotted angle have been introduced by **Dexion (Canada) Limited.** These are: the 140, a light duty angle, 1⅜ in. by 1⅜ in., and the 112, measuring 1⅛ in. by ¾ in. An appropriate slotted angle is available for display stands, models and workshop framework. (363)

Coilmount conveyors

A complete guide to the correct selection of stock size Coilmount conveyors is contained in **Link-Belt's** new Book 2644. A capacity selection chart together with engineering data and diagrams, is included along with dimensions and specifications of stock components. (364)

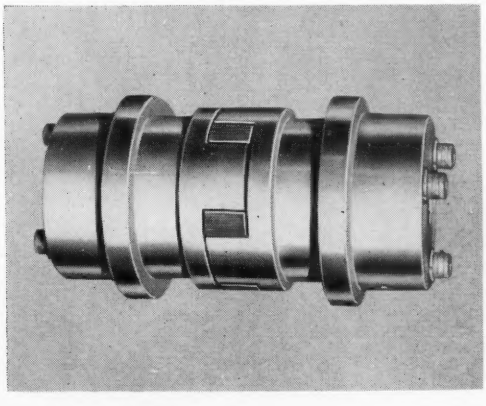


Drawn cup roller bearings

Drawn cup roller bearings for installations requiring high capacity in minimum space have been introduced by **The Torrington Co.** Compact and light, they are suited for applications demanding precision, minimum cross section, high speed endurance, or long pre-greased life. They have given satisfactory service in the textile, automotive, aircraft and appliance fields.

They may be mounted so that a hardened and ground shaft serves as inner race, facilitating use of larger and stiffer shafts. Inner races are available for use with soft shafts.

End guidance stabilizes the rollers and leaves the centre open for free circulation of lubricant. The turned-in lips of the bearing cup, riding close to the shaft, exclude dirt. The new bearings are made in six sizes 3/16 in. to 1⅛ in. shaft diameters. (365)

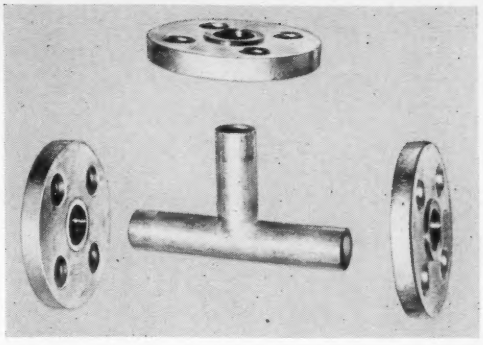


Flexible coupling

A radially removable flexible coupling which provides a simple means of disconnecting two units without axial movement of the shafts has been announced by the **Lovejoy Flexible Coupling Company.**

Known as the Type RRL, this coupling simplifies maintenance and is suited for applications where such driven equipment as a pump must be disconnected while the driving unit continues to operate. All that is required in such cases is to disconnect the coupling itself.

Horsepower ratings are from 7.5 to 40 at 1800 rpm. Maximum bores range from 1⅜ in. to 2¼ in. with maximum OD's from 2 9/16 in. to 5 in. Overall length runs from 6⅛ in. to 7⅝ in. No maintenance or lubrication is needed. (366)

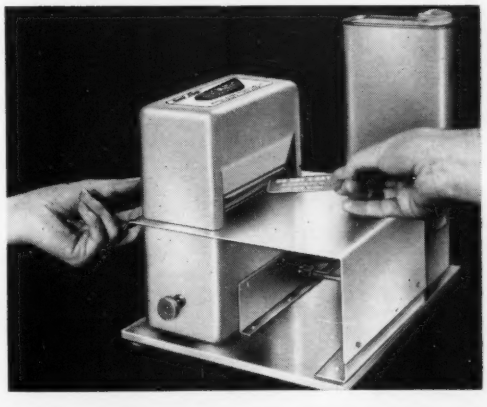


Insert flanges

The maintenance and repair of stainless steel process line is made easy with Speedline insert flanges. It is now possible to tie in new equipment and break into existing lines and headers without resorting to welding. Previously, the maintenance and repairs to process piping, especially in hazardous areas, required costly down time because of the welding that was necessary.

Easy to perform expanding of pipe or the stainless steel fittings into Speedline insert flanges minimizes the out of production time and gives strong leak-proof joints.

The press fit between the insert and the flange assures that the pipe or fitting can be expanded into the ferrule permanently and further facilitates usage in that only one piece has to be handled. **Horace T. Potts Company** manufactures the fittings. (367)



Motorized dispenser

The Cal-Matic dispenser, a motorized applicator for activating etched and anodized, pressure-sensitive aluminum foil nameplates, has been developed by **North Shore Nameplate, Inc.**

With the dispenser, users of Therma-Cal aluminum foil nameplates no longer need to manually apply solvents; one operator does the entire labeling operation in a fraction of a minute. It requires no maintenance and contains no glass parts. The chemical tank holds enough solution to treat thousands of nameplates without refill.

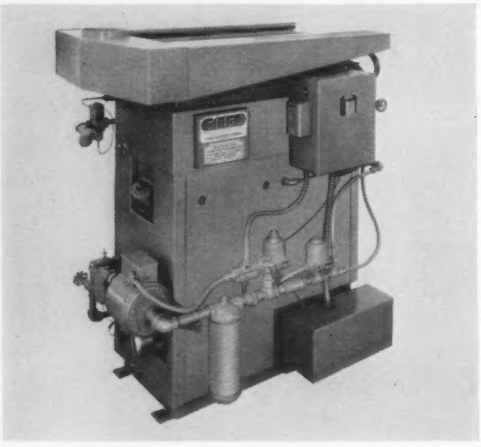
The dispenser has a built-in safety stop which assures hazard-free operation. The rollers automatically stop if fingers or other foreign elements enter the machine. (368)

Worm gear drives

The right-angled shaft arrangement of worm gear units, as manufactured by **The Cleveland Worm & Gear Company,** permits a saving of valuable floor space by placing the motor and reducer in line, parallel to the driven machine. The worm gearing has a high shock load resistance because the teeth are under a crushing load rather than a cantilever load, as in other forms of gearing. (369)

Gyrol fluid drive

The Type VS Class 2 Gyrol fluid drive, which is available through **American-Standard Products (Canada) Limited,** offers an adjustable stepless speed control which is designed to be applied to industrial machinery. For control there is available either Micro-Scoop or Lever Speed control which allows minute speed adjustments over a wide range, at the same time providing a means of rapid clutching or declutching where required. (370)



Cleaning machines

Seven standard ultrasonic cleaning machines are offered by **Circo Equipment Company.** The removal of buffing and polishing compounds, honing and abrasive materials, machining chips and non-soluble deposits is now practical and rapid with these machines. Blind holes and inaccessible recesses no longer must be hand scavenged and wiped clean.

The units are equipped with sump thermometers, drain valves, thermostats, and bulb-actuated water control valves. There is a removable cleanout door with steam, electric or gas fired heating elements.

High peak levels of ultrasonic energy are transferred to the cleaning chamber through stainless steel-encased barium titinate transducers. At an operating frequency of 40 kilocycles, maximum cleaning or caitation results with the minimum energy input. Transducers are matched to the output of the ultrasonic generator. (371)

Engine oil cooler

An adaptable, efficient plate-type engine oil cooler is being offered by **Long Manufacturing Company.** The unit, in varying two to eight plate arrangements, is designed to be used on or in any engine requiring lubricant cooling. It may be applied to any type of oil cooling, such as in transmissions, torque converters and hydraulic presses.

When cleaning or replacement is indicated, the multiple-plate core assembly can be removed from the housing without disturbing the water connections. Any reasonable number of plates may be assembled in parallel, in series, and in parallel series, according to the operating conditions. The turbulators are designed to minimize the pressure drop across the plates. The cooler can be attached to the engine as an accessory or built into the block. These units employ only the cooling element assembly with mounting plate, and use the engine water within the block for cooling. (372)

Over-running clutches

Two series of sealed, double ball-bearing sprag clutches for over-running, indexing and backstopping purposes are now available from the **Formsprag Company.**

Intended primarily for applications in which the retention of light oil is essential to long life and accuracy, they are also specified for situations where abrasives are present in the atmosphere. The seals prevent contaminating particles from entering the clutch.

Series B is recommended for true over-running applications, for low speed service where the inner race over-runs (where both races rotate during some portion of the cycle). It is available in bore diameters from 2¼ in. to 5½ in., with torque capacities from 1,875 to 11,600 foot-pounds. Series C is intended for indexing and backstopping applications. (373)

Steelflex couplings

Connecting driving or driven machinery with a Falk Steelflex coupling **(The Falk Corporation)** affords double protection in that the coupling's torsional resilience smothers the shock and vibration, and its design prevents damage and lowered efficiency by accommodating shaft misalignment. One basic design, Type F, in many sizes, is adaptable to more than 90% of all industrial applications. (374)

Magnetic clutch

Tests have shown that magnetic clutches reduce delay time and provide instant response to controls. The Fawick magnetic clutch is a product of the **Fawick Corporation** and is adaptable to existing designs and machines. It provides complete control of acceleration and deceleration plus exceptional torque under all rated conditions — with remote control through push buttons, relays, or limit switches. (375)

Ball bearing screw assemblies

The range of applications of the ball bearing screw assembly is almost limitless. In the aircraft and industrial fields, wherever rotary motion is to be translated to linear, or linear to rotary, the rolling ball principle applied to a screw and nut is the most efficient known mechanism. **The Saginaw Steering Gear Division** of General Motors Corporation manufactures these assembles. (376)

Power steering system

Air-O-Matic 500 Series power steering system for highway and heavy duty vehicles has been introduced by **Air-O-Matic Power Steer Corp.** It requires little air for operation, is rust and corrosion resistant, and there are no oil leaks. The system is safe . . . if air fails the system reverts to manual. There is no over steering and wheel return is normal. (377)

SECTION J

Testing

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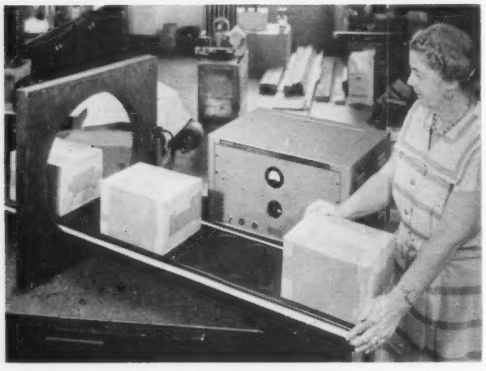
Brinell hardness tests

A bulletin issued by the Testing Machines Division of **Gries Industries, Inc.,** covers methods and machines for rapid yet "standard" Brinell Hardness Tests in routine production. The bulletin states that for the first time it is possible to see automatically the diameters of the ball impressions (as required by the "standard" specifications of the Brinell method) on a motorized machine for rapid production Brinell testing. (378)



Tramp metal detector

The Model TM metal detector automatically signals the presence of unwanted tramp metal particles in non-metallic materials, either packaged or in bulk. It is made by **J. W. Dice Company.** Typical products which can be inspected automatically, and at conveyor speeds up to 1,000 fpm, are foods, plastics, lumber, paper, confections and ceramics and stone products.

The detector is sensitive to both ferrous and non-ferrous tramp metal particles. Contaminated material passing through the test coil causes a reject relay to operate in the electronic unit. This relay can be used to sound a warning gong, trigger a marking device, or operate a reject gate.

Inspection apertures can be made any convenient size and may be mounted in any position to permit passage of the product. Use of these detection units serves to guard product quality, and eliminate unnecessary shutdowns. (379)

Stroboradiography

A new photographic technique, stroboradiography, capable of producing motion pictures of the interior of an engine while it is running, may soon have a significant effect on engineering design.

The process, according to **Du Pont of Canada,** involves taking X-ray pictures of the internal movements of an engine through its steel housing and visually "stopping" with a camera their high-speed motion. Special stroboradiographic equipment for the job was developed by the General Electric Company (U.S.) for use with its high-energy industrial X-ray betatron. With this equipment, thousands of split-second X-ray exposures accurately synchronized with the moving part can be obtained. Using an exposure time of 10 to 15 millionths of a second it is possible to radiograph an engine turning at several thousand revolutions a minute.

The resulting slow-motion X-ray movies and still pictures of pistons, cams and other moving parts have enabled engineers to scrutinize, for the first time, complete cycles of engine operations for faulty performance or wear. (380)

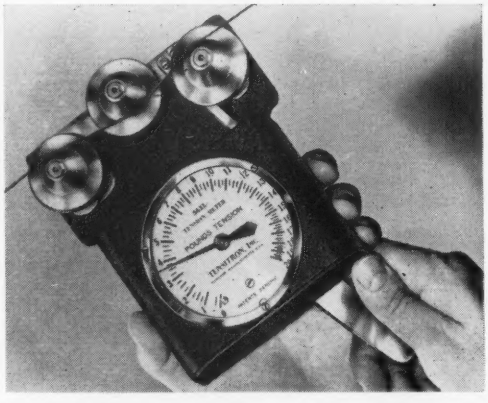
Balancing machines

The Gisholt Dynetric Type U balancing machines, available from **J. H. Ryder Machinery Co. Ltd.,** provide a modern means for quickly and accurately measuring and locating dynamic unbalance in rotating parts or assemblies weighing from 25 to 100,000 pounds. These machines are available in several standard sizes for operation at speeds between 150 and 2,500 rpm. Machines are generally arranged for rotating the workpiece about a horizontal axis by means of an end coupling type of drive, but vertical axis and belt drive adaptations are also available.

The time required for measuring and locating unbalance is only 30 seconds, in which the amount and location of the corrections required in the two selected planes are accurately determined. (381)

Immunol 438

A material for aqueous phase magnetic particle inspection of metal to detect flaws has been developed by **Harry Miller Corp.** The new product, used in this non-destructive method of metal inspection, is called Immunol 438. It replaces kerosene and mineral spirits, gives a better definition of flaw and prevents rusting of the metal. In addition, the product eliminates the fire hazard since it is nonflammable, is odorless and self-cleaning. It is particularly economical since one drum replaces many drums of solvent. (382)



Twenty pound tension meter

A light weight tension meter for checking tensions during the processing of yarns, cords, and wires is announced by **Tensitron, Inc.,** makers of instruments for the measurement and control of tension and torque. The instrument has a range of one to twenty pounds, with great resolution at the low tension end.

It features a lever-inserting mechanism whereby two outer rollers are lowered or raised simultaneously. The controlling lever is at the side of the instrument away from the moving material, thus protecting the operator's hands, and the moving material is kept away from the observer at all times.

The rollers are tapered, thus widening the opening where the material to be tested is placed, and at the same time guiding the material into test position. Wide flanges at the bottom of the low-inertia rollers hold the material securely in place while the tension is read as the material travels. (383)

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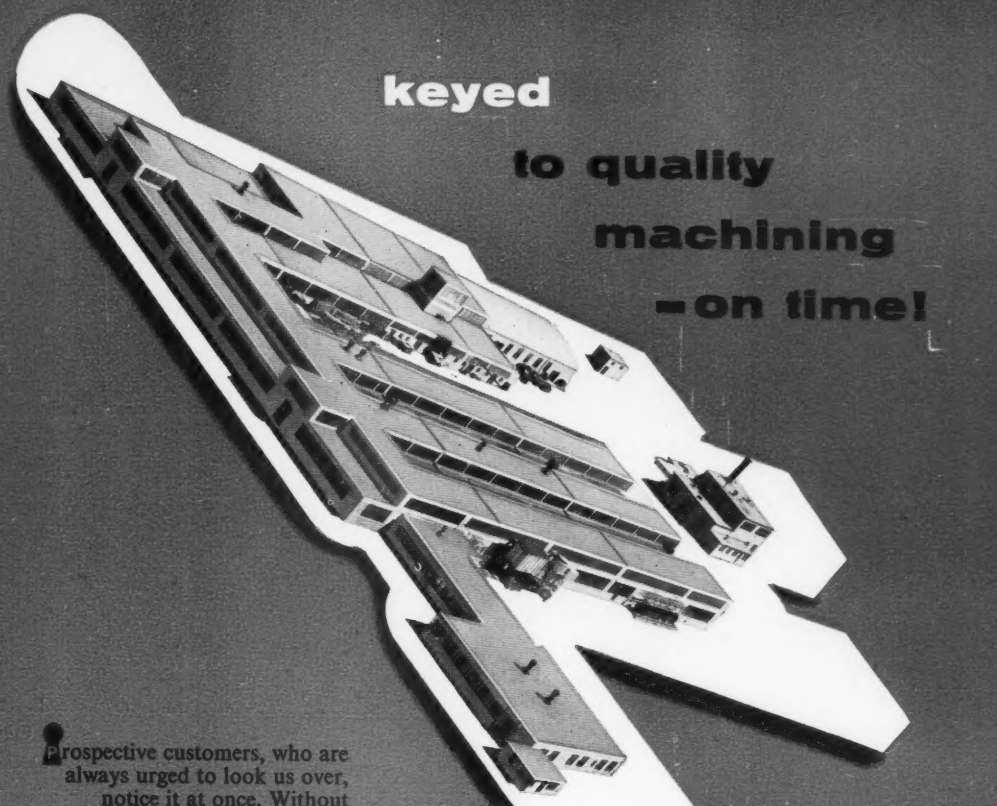

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to quality
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Renfrew is equipped for large production of complete units or parts, as well as machining, stamping, pressing and all types of welding.

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Our governing policy is accuracy and exact compliance with customer requirements. *No customer will ever be more exacting than our own Inspection and Testing Department.*

You owe it to your Company to test our facilities and challenge our skills.

Enquiries are invited and we shall promptly supply any further information required or arrange for a Technical Representative to call at your convenience.

Renfrew

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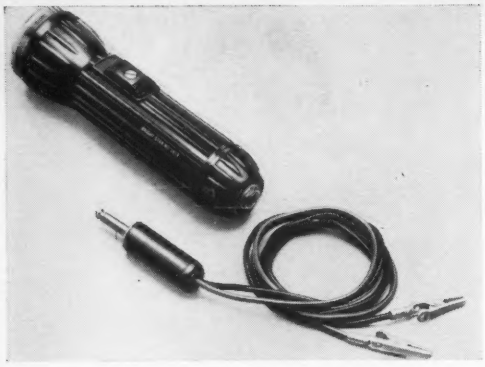


Circuit continuity tester

A combination spotlight electrical circuit continuity tester, No. 1618CT, featuring an industrial flashlight with built-in jack, is being marketed by **Bright Star Industries, Inc.**

The test leads use plug and clips for instant attachment. This tester, which works through a three volt battery supply has many uses, such as checking wiring, controls, circuits, fuses, grounds, shorts, opens, broken wire, switches, limits, relays, burglar alarm systems, also for checking and setting contacts as desired.

By using two testers in a series, it is possible to check wiring or controls and cables of a reasonable length (approximately 1,000 ft 18 gauge copper tinned wire to 5,000 ft 12 gauge copper tinned wire), at two different places, or where two men cannot see or hear each other. (384)

Vibration meter

The vibration meter is designed for the direct measurement of the three important characteristics of vibration, the displacement, velocity and acceleration. Unwanted, or excessive vibration in machines and structures can be easily located so that the necessary corrective action can be taken before serious damage occurs. The instrument is invaluable at all stages of research, design and production testing, where the detrimental effects of wear and noisy operation must be avoided.

The vibration meter Type 1403, available from **Dawe Instruments Ltd.,** comprises a vibration pickup and a high gain amplifier incorporating integrating and differentiating networks and an adjustable attenuator, together with a direct reading indicating meter.

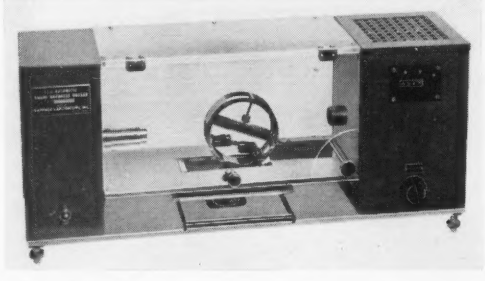
The required characteristic of vibration, displacement, velocity or acceleration is selected by a three way switch. The instrument can be used as a sensitive audio frequency valve voltmeter or as an amplifier. (385)

Hi-pot tester

A light-weight portable hi-pot tester is now available that provides a safe means of high voltage testing on installation, maintenance or repair work where the use of high voltage testing cages is either impractical or impossible. It eliminates the need for dangerous temporary or makeshift rigs which are all too often employed in this class of work.

Distributed by the **Haskin Company,** it has six voltage ranges of 500, 750, 1,000, 1,500, 2,000 and 2,500 volts with a continuous output rating of 0.25 kva and a short circuit current of 1.1 amperes at maximum voltage. Special test probes with spring-loaded shrouds are included and provide maximum safety for the operator against the dangers of inaccurate or careless handling.

A fault-locating device is built into the instrument. (386)



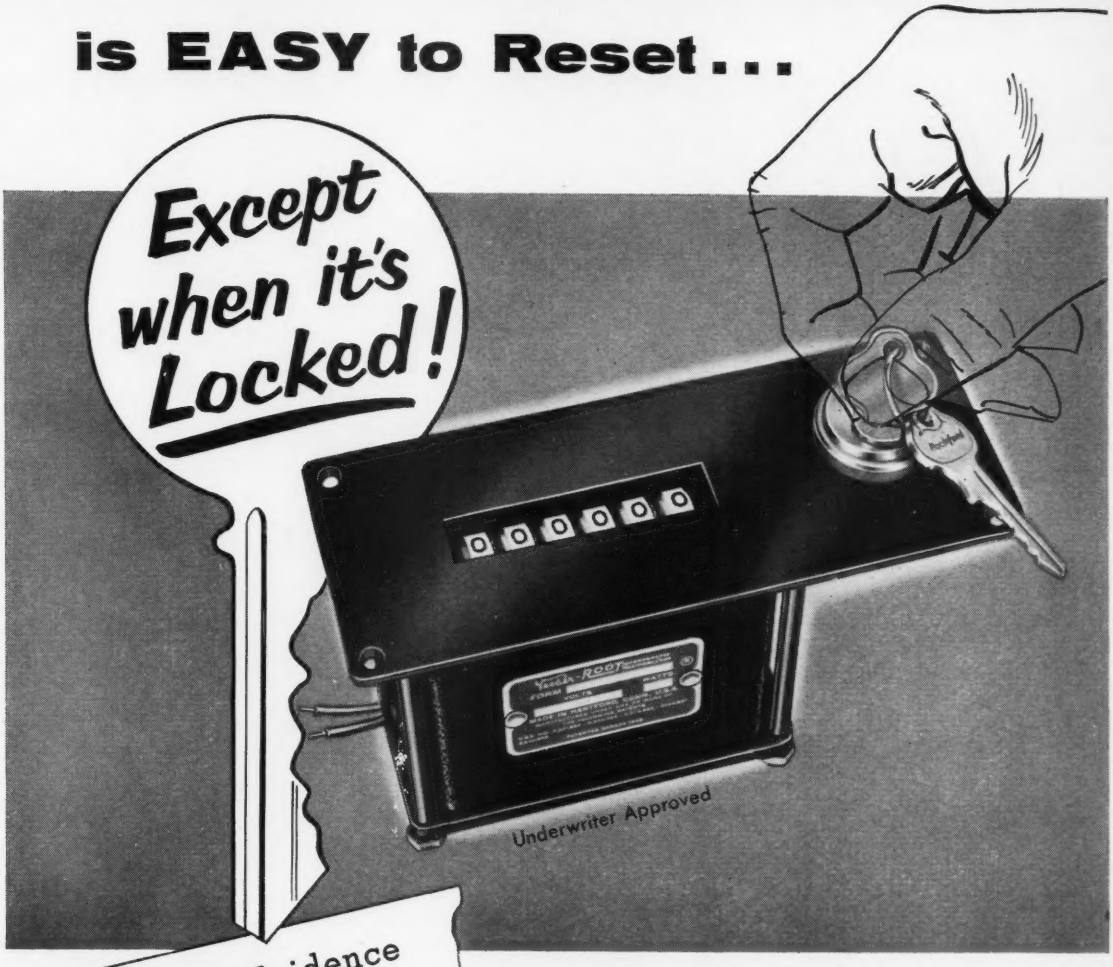
Hardness tester

An instrument for measuring hardness of painted surfaces is manufactured by **Gardner Laboratory, Inc.** It provides greater accuracy by eliminating human errors and other variables that distort test results. Operation of the ICI automatic sward hardness rocker depends on the number of times in a given interval a pendulum-like rocker oscillates over the surface being tested; the harder it is, the more oscillations. Automatic counting takes place as a shutter on the rocker interrupts a light beam, focussed on a phototube in the counting circuit. Total interruptions or oscillations are presented digitally on a four digit register.

The basis of the counter circuit in the instrument is a sigma model L CdS photo-relay. Developed for "light, no-light" applications such as this, the photo-relay consists simply of a cadmium sulfide cell and Sigma Series 41 relay housed in a dust-proof can 1½ in. square x 1⅞ in. high, mounted on a 5-pin base. (387)

Continued on page 80

This NEW Magnetic Counter is EASY to Reset...



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Designed for panel mounting where remote indication is required, this electrically operated counter is a compact package 5.5″ long, 2.1″ wide, 2.7″ high. Capacity: 1,000 counts per minute. Power consumption, 8 watts. Stocked in 110 and 220 AC and DC. Easy to reset, except when locked . . . then the sturdy tumbler-lock* puts the damper on tampering. Yet one turn of the key resets all 6 figures to zeros.

This new Magnetic Counter is one of the thousands of Veeder-Root standard and special counters . . . electrically, mechanically and manually operated . . . in daily use throughout the world in industry, business, science and medicine. You, too, can count on Veeder-Root . . . to help you count anything you need.

*National Lock Co. Lock No. 68-4837; Key D-428

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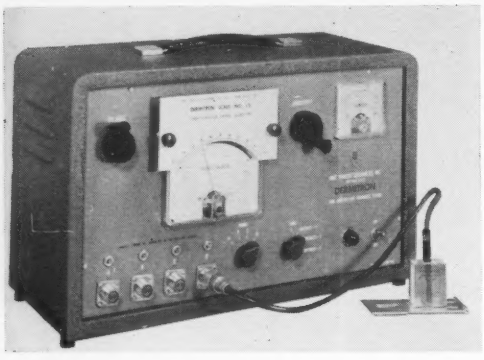
Spark proofing kit

A line of electrical spark proofing kits is announced by **Lamson Mobilift Corporation.** The kit is for use on gasoline engines in industrial trucks that are operated in areas where semi-hazardous fumes or elements are present. The kit, which is factory-installed, consists of a totally enclosed and shielded distributor, a shielded ignition coil and sealed Romex cables which enclose all high voltage wires. (388)



Coating thickness tester

A non-destructive coating thickness tester, Dermitron Model D-2, has been developed by **Unit Process Assemblies, Inc.** This portable instrument, for both laboratory and production use, gives fast, accurate and direct readings of virtually any coating on any base, including metal coatings (such as plating) on metal base; non-metallic coatings (such as paint, anodizing, porcelain) on metal base; and metal films on non-metallic base (plastic, ceramics).

The tester comes with four measuring probes for extra wide thickness ranges from thin to thick deposits, and requires only a ⅛ in. circle-area for measurement. It can also be used for sorting and matching of metals and alloys. (389)

Lead comparator

Larger diameter and longer length threads can be measured more quickly and more easily with the bench Model SK-1003 lead comparator, manufactured by **Jerpbak-Bayless Company.** It affords ease of inspection where the thread diameter is smaller than the body or head diameter, in such instances as bolts. It inspects threads without removing the driving dog from the work. It requires no adjustment to centralize the points with the centreline of the work piece. (390)

Sand and dust chamber

A new type of sand and dust environmental test chamber, manufactured by **Tenney Engineering, Inc.,** is now available with complete instrumentation. The chamber stabilizes the composition and density level of sand and dust, according to MIL-F-5272A, by continuously purging a small amount of dust-laden air which is recirculated to exhaust outside of the chamber. Make-up air and sand and dust replace the exhausted air. Now relative humidity is automatically maintained. Chemical dehydration is not required.

Available in a wide range of standard velocity levels for applicable MIL specs, the units incorporate mechanical refrigeration and heating systems that supply uniform internal chamber temperatures with operating ranges of 25 C and 70 C, tolerances ±2 C. Relative humidity is maintained below 30%. Other standard features include convenient high capacity sand hopper and nine-point, 35-ampere terminal connection.

The chamber is furnished with a full opening door with viewing window which is supplied with wiper and illuminating fluorescent light. (391)

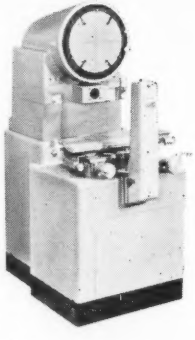
Vacuum regulator

The Conoflow Model VH-20 vacuum regulator is finding wide application in aircraft industry and government test facilities where accurate simulation of high altitude conditions is required. It is also suited to laboratory use.

The Model VH-20 affords extremely accurate control of vacuum in low capacity systems; capable of holding vacuum to as low as 1 in. ±.05 in. mercury. It is available from stock in ¼ in. size, of forged brass and stainless steel construction. (392)

Bench scales

A line of all-steel full capacity beam bench scales is announced by the **Douglas Homs Company.** The necessity of adding, removing and frequently misplacing loose counter weights is eliminated. All models are portable and a locking device permits use of the beam as a convenient carrying handle. The scales are suited to easy mounting of dial and over-and-under (prepack) indicators and units are available with adjustable tare bars. (393)



Contour projector

A heavy duty contour projector, Model 14-5, combining maximum table travel and a 14-inch screen is available from the **Eastman Kodak Company.** Large, heavy parts unsuited to projection on smaller equipment may be handled easily on the Model 14-5 because of its extra-large worktable which enables it to withstand greater weight without measureable deviation.

Designed to measure intricate parts to the order of .0001 in., or to be used for routing gauging by comparing the image of the part with a chart, the projector embodies advanced optical design. A Kodak relay lens picks up the image of the part, directs it into projection lens at the rear of the cabinet. When surface illumination is used, light is emitted through the relay lens, strikes the part, and is reflected back into the relay and thence through the optical system to the screen.

An Ektalite field lens, behind the viewing screen, directs light at the operator to assure a bright image with either shadow or surface projection. (394)

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Guessing games are expensive in specifying springs. Very often, springs *look* alike, but each is different because each is designed to do a specific job.

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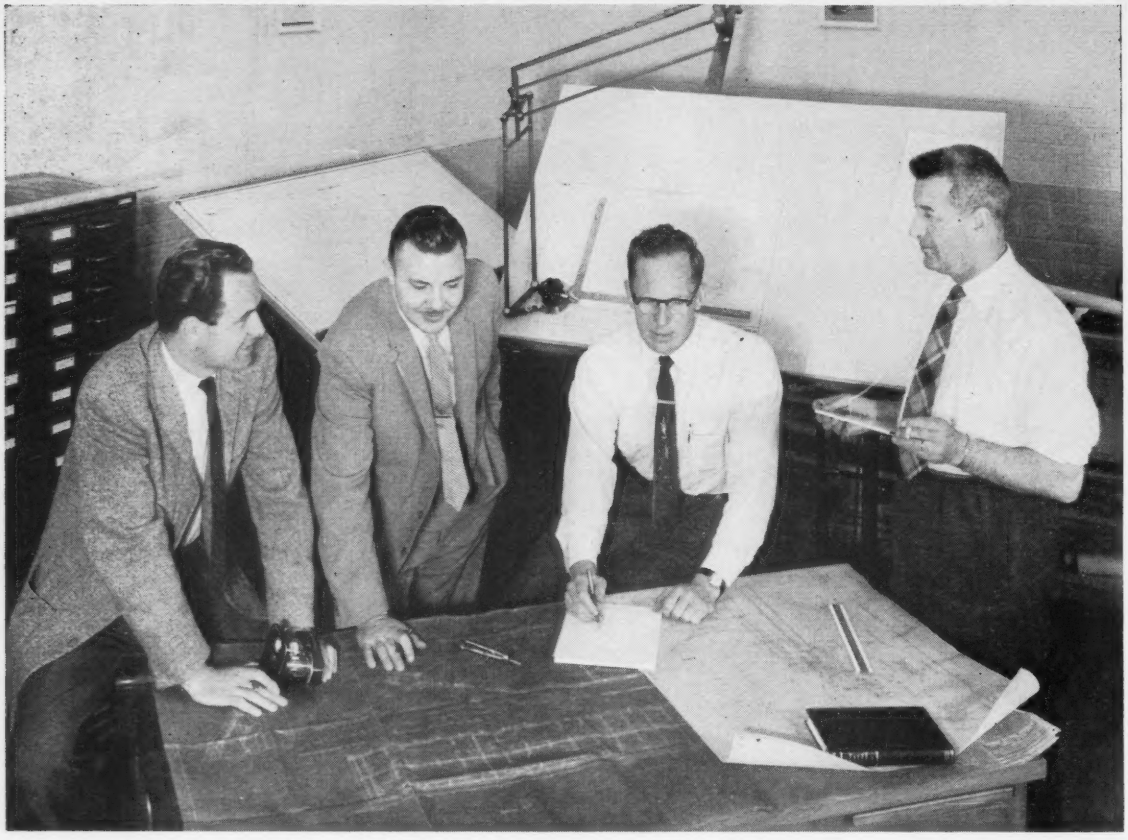

Team effort scores high in solving design problems. Here are Messrs Anthony, McAvoy, Harrison and Florescu, part of the design team at Dowty Equipment of Canada Limited.

A well-designed product is the result of bringing together the specialist skills of a group of engineers, whose individual interests and experience differ, and whose work may be in the design, the production, the testing, or the application fields.

A design engineering team of four or five engineers often finds better solutions to problems in less time than four or five men working as individuals.

Design Engineering is serving a useful purpose in keeping the engineering teams informed about new products, materials, and processes.

G. L. Harrison, Chief Project Engineer,
Industrial Division,
Dowty Equipment of Canada Limited.

Manufacturers selling to Canada's original equipment market will realize the importance to them of the last paragraph in Mr. Harrison's statement.

More and more, Design Engineering is becoming the "market place" in which sellers of materials, parts, components and finishes meet the people with authority to specify and buy their products.

For more sales of **your** products, you too should join the growing list of progressive manufacturers doing business through the advertising pages of Design Engineering.

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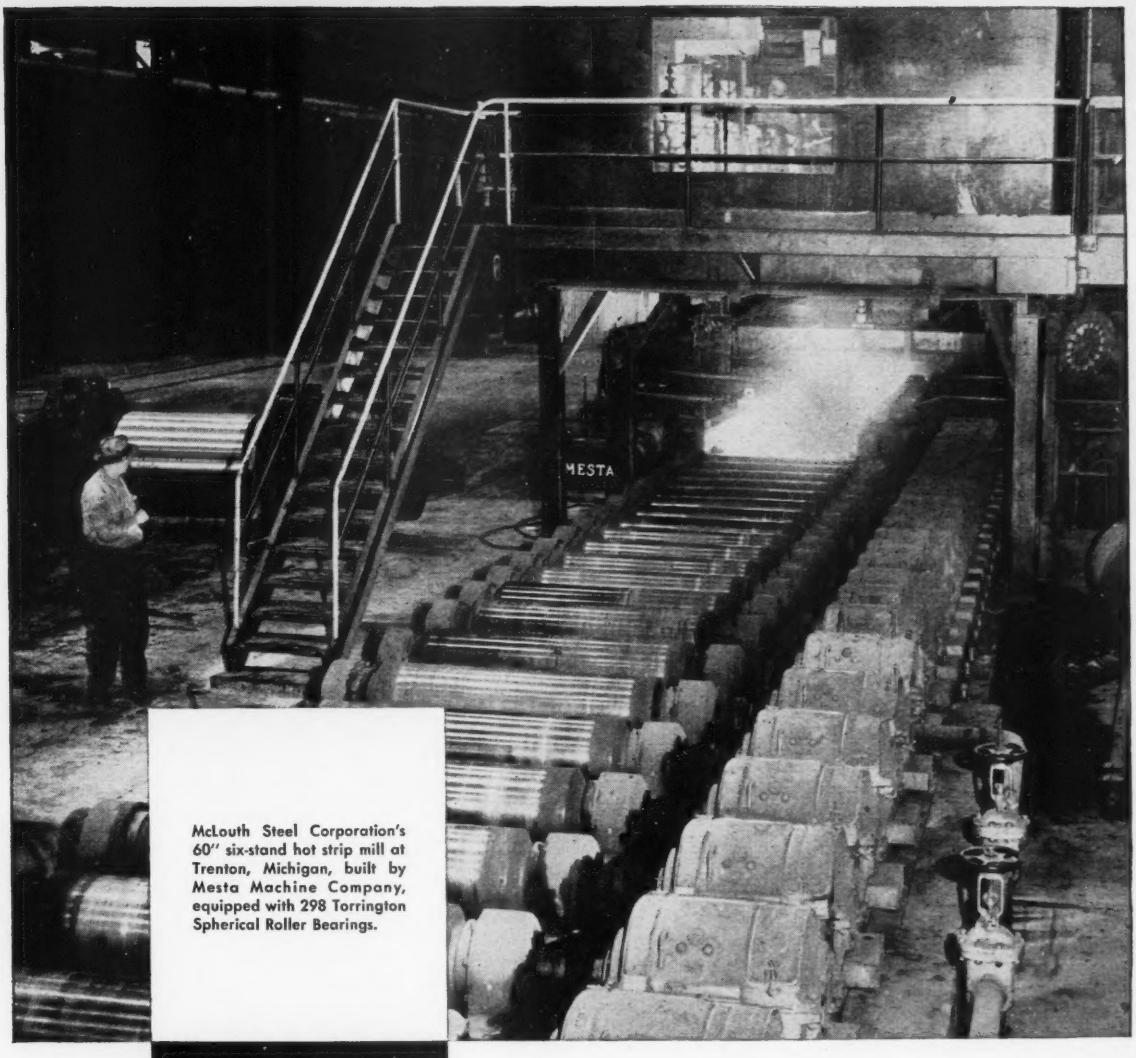
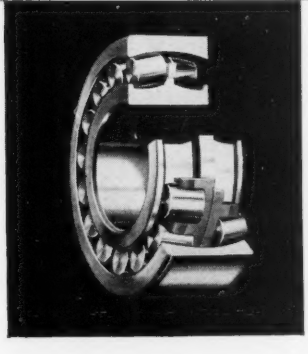


McLouth Steel Corporation's 60" six-stand hot strip mill at Trenton, Michigan, built by Mesta Machine Company, equipped with 298 Torrington Spherical Roller Bearings.



Self-driven table rolls mean drastic cut in mill down time!

It was a new idea. Suppose mill approach and runout table rolls had their own independent motors and pillow blocks instead of conventional gearing and line shafts? Then any roll could be removed for maintenance and replaced immediately by a stand-by assembly without shutting down the whole table for hours!

Torrington engineers, working with Mesta engineers, came up with a design mounting Torrington Spherical Roller Bearings in Torrington-built fixed and floating pillow blocks. These bearings compensate for misalignment across the table and for dynamic deflection of the rolls under load. In both roughing and finishing mill tables, 298 Torrington Spherical Roller Bearings have been operating efficiently since 1954!

The Torrington Company, with experience in the manufacture of every major type of anti-friction bearing, has made thousands of installations in steel mill equipment that have helped roll record tonnages. Your Torrington engineer is an expert: call on him when you need help. *The Torrington Company, Limited,* 925 Millwood Road, Toronto 17, Ont., Canada.

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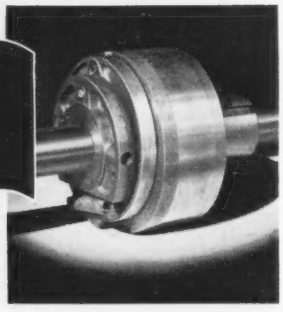

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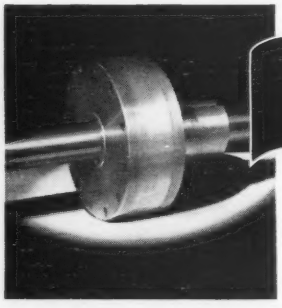

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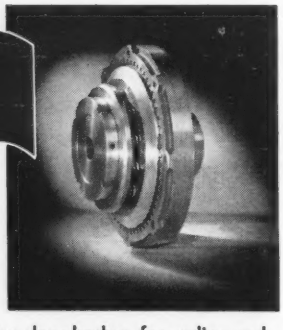

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Hilliard's Engineering Department is ready to assist you in designing installations and in selecting the correct clutch or coupling.
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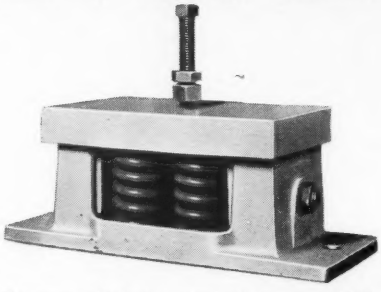
Advanced Engineering Design calls for Vibration Isolation



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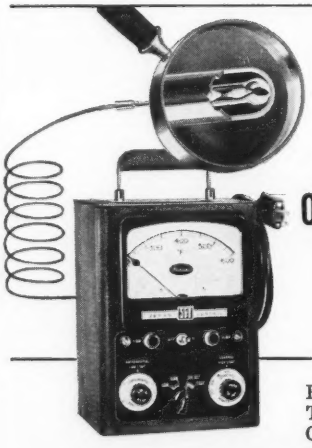

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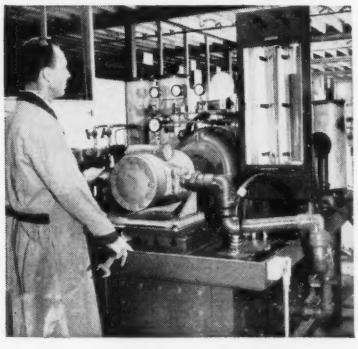

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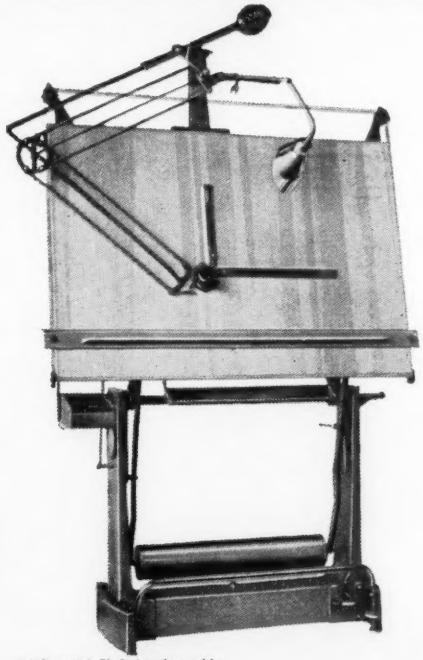

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Board size: 40"x60", 40"x80", 50"x80"
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Trends

Heat pump

The new Coliseum in Vancouver will use the heat pump principle. The source of heat will be the refrigeration equipment installed for the ice rink.

Although the principle of the heat pump is not unknown on this Continent, this particular installation is interesting because the heat source is obtained from equipment that is already in the building. The heat available is, in fact, that used in the process of turning the sheet of water into ice.

Flying Spot microscope

At a symposium presented by the New England section of the Optical Society of America, Du Mont engineers exhibited and demonstrated a combination optical and electronic device, called the Flying Spot microscope. Using television principles to scan microscopic specimens, the system will make possible studies in microscopy never before undertaken because of the inaccuracies due to human error and the spectral and other limitations of the eye.

Atomic energy

A method of producing atomic energy without using uranium has recently been announced. The new process is called catalyzed nuclear reaction. The energy comes from the fusion of a few hydrogen atoms.

Free-piston engine

Now out of the laboratory stage, the free-piston engine is ready to compete on its own for power jobs, in the opinion of General Motors' research engineers. Large size free-piston-turbine combinations now have a fuel economy in the range of similar diesels.

It is claimed that these engines have a very bright future since large units now operating in ships and stationary power plants have an over-all efficiency of 37%.

Dynistor diode

New semi-conductor devices have been developed in recent years to carry out functions hardly dreamed about a decade ago. In this field neuter materials — neither all insulator nor all conductor — have been consistently making possible quicker and more reliable control on all types of electrical equipment.

The most recent newcomer in this semi-conductor field is the Westinghouse-developed Dynistor diode. With some characteristics of a transistor and others of a diode, it offers some outstanding potential applications in power control.

Nickel-chromium alloys

Recent trends in aero-engine development have increased the use of nickel-chromium alloys to aid development of greater speeds at higher temperature. A cast nickel-chromium base alloy has recently been developed with exceptional resistance to temperatures as high as 1,515F, some 100 deg higher than the best commercially available wrought materials.

Landing gear

A new type of landing gear developed for heavy air force cargo planes with a gross weight of about 100,000 lb has been developed by Lockheed Aircraft Corporation. Instead of the conventional arrangement the new device has two wheels, one in front of the other (as on a bicycle) on each side of the aircraft.

This tandem arrangement promises several advantages including improved reliability, smaller concentration of weight on the runway and a narrower housing when the wheels are retracted.

Gas turbine truck

Through the co-operative efforts of Chevrolet and G.M. research engineers has come the development of an experimental gas turbine powered truck called the Turbo-Titan. The engine is a modified version of the Whirlfire gas turbine engine.

Ion propulsion

A research contract has been awarded to Rocketdyne (a division of North American Aviation, Inc.) to study the feasibility of ion propulsion as a possible source of economical power for missiles.

An ion propulsion system theoretically would obtain thrust by using high velocity charged particles; conventional chemical rockets, ram jets and turbo jets use high velocity hot gases. Ions are atoms or molecules stripped of one or more electrons. In this form they are energized by electricity to create thrust.

Magnetic Alloy

Improved magnetic amplifiers, switching and memory devices, pulse transformers and power transformers will be possible as a result of a new magnetic alloy developed by Bell Telephone Laboratories. This material will permit reductions in the size of magnetic components without any sacrifice in performance and will facilitate the design of new components having greatly improved performance characteristics.

Called Supermendur (49% iron, 49% cobalt and 2% vanadium) this alloy has a number of exceptional properties (including higher permeability and lower hysteresis losses at higher flux densities) than any material previously available.

Aeroquip

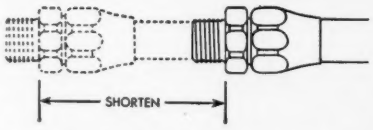
Engineering Notes

B. A. MAIN, JR.

The advertisement at the right says you can save money if you buy Aeroquip Hose Lines. Let's see how right this statement is.

Consider the production line along which a product using hose of Teflon is assembled. Your purchasing department will buy anywhere from three to six months' supply of hose lines to feed the production line. In this day and age of rapid change, it is pretty much a foregone conclusion that some engineering revision or modification will be required on the product.

Where these changes affect the hose lines, if you purchased Aeroquip Hose Lines originally, the detachable, reusable hose fittings always used by Aeroquip make it possible to rework the hose lines. Should the hose lines need to be shortened, it is simple to remove one of the hose fittings, cut the hose to the proper length and re-assemble. If the hose



line needs to be longer, a new piece of hose can be installed easily, using the same fittings over again. This can be done in your plant by your own people, or if our costs are lower —as they might be if the quantity of lines to be reworked is large—you can have them reworked by us.

The advertisement shows the proportion of cost of a hose fitting to the cost of the hose assembly. This proportion varies with the complexity required in the hose fitting. A fitting composed of complicated bends of rigid tubing, with perhaps one or two bosses welded into it, may run several times the cost of the hose itself. In any case, simple or complicated, the cost of the fittings will usually exceed the cost of the hose.

If you purchase hose lines with permanently attached hose fittings, no rework is possible and you must pay at least double for the privilege of making an engineering change. If you purchase Aeroquip 2802 Hose Lines made of Teflon you can, as the ad says, save money—often more than half of what new hose lines would cost you. And, you can buy the Aeroquip Hose Line with its Detachable, Reusable "*super gem*" Hose Fittings at prices competitive with the price you pay for hose lines made of Teflon with permanently affixed hose fittings.

B. A. Main Jr.

VICE PRESIDENT, ENGINEERING
AEROQUIP CORPORATION

Hose assembly pictured has male pipe and JIC swivel fittings for industrial applications. Aircraft hose lines use more complicated fittings that represent a much higher percentage of the total hose line cost.

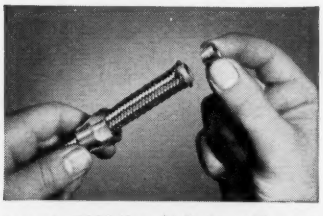
Aeroquip 2802 Hose Lines (Teflon*) Cost Less

BECAUSE "*super gem*" FITTINGS ARE REUSABLE

Hose lines made of Teflon excel where applications require lubricity, non-adhesion of sticky or viscous materials, resistance to temperatures up to 500° F., chemical inertness and extra long wear. Admittedly, these hose lines are expensive, but their true cost cannot be determined by purchase price alone. Hose lines of Teflon with permanent-type, swaged-on fittings are priced competitively with Aeroquip 2802 Hose Lines (Teflon), but Aeroquip "*super gem*" Fittings are reusable and can be salvaged. And the fittings are the most expensive part of any hose line!

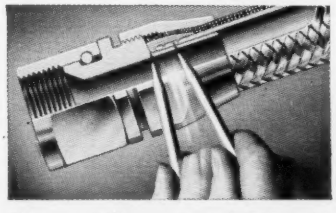
Because it had purchased a "production quantity" of hose lines made of Teflon with permanently attached fittings, one company was forced to scrap more than $100,000 worth of hose lines due to a single engineering change. With Aeroquip 2802 Hose Lines, the "*super gem*" Fittings could have been salvaged and reused with savings of thousands of dollars.

Not only do "*super gem*" Fittings give Aeroquip 2802 Hose Lines cost-cutting advantages, they assure the ONLY leakproof, ageless assembly of fitting and hose of Teflon. Want more information? Mail this coupon:



Aeroquip 2802 Hose (Teflon) and "*super gem*" Fittings can be assembled by hand in a few minutes. No expensive swaging machine is needed. A wrench and vise do a perfect job.

"*super gem*" is an Aeroquip Trademark.



Cutaway of "*super gem*" Fitting with metal-to-metal line seal pointed out at left and lip seal at right. Together, these features assure permanent protection against leakage.

*DuPont trade name for its Tetrafluoroethylene resin.

Aeroquip (Canada) Ltd.
Toronto 10, Ontario

Please send me the following information on reusable "*super gem*" Fittings and Hose made of Teflon:

- ☐ Industrial Engineering Bulletin IEB-26A.
- ☐ Aircraft Engineering Bulletin AEB-13.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ Prov.____

Aeroquip

REG. TRADEMARK

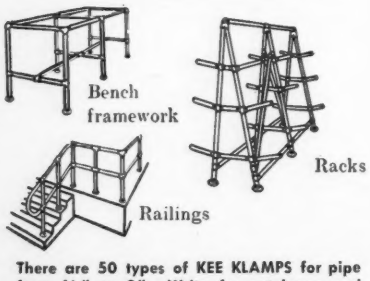
AEROQUIP (CANADA) LTD., 287 BRIDGELAND AVE., TORONTO 10, ONTARIO

Storage Racks — Guard Rails made easily with KEE KLAMPS —

the malleable, galvanized fittings with the case-hardened grub screws.

Your unskilled labour can cut Standard Iron Pipe, insert it in the KEE KLAMP (no threading) and tighten the grub screw with an Allen wrench. It's as simple as that.

We will suggest the most economical design for your purpose when you ask us for a quotation.



There are 50 types of KEE KLAMPS for pipe from ½" to 2". Write for catalogue and Canadian Stock List.

KEE KLAMP DIVISION
of O'Donnell-Mackie Limited
97 Wingold Ave., Toronto 10
RUssell 7-3911

Hydraulics & pneumatics

(continued from page 54)

Vacuum valve

A ultra-high vacuum valve (VAU-25) for handling pressures of 10—[10]mm Hg and lower in the laboratory is now available from **Consolidated Electrodynamics Corporation.** The valve is used in ultra-high vacuum systems where non-contamination and the ability to be baked out are of the utmost importance. Effective conductance of the valve for nitrogen is only 1 x 10—[11] litre per second.

The valve consists of the valve assembly (which becomes part of the vacuum system) and the diver mechanism, which opens and closes the valve. Because they are separate, the valve can be baked out at high temperatures (up to 450 C) without also baking the driver threads and lubricant.

The driver mechanism has a different screw and is rotated by a torque wrench. The differential screw exerts a load of about 1½ tons on the nose of the valve assembly, forcing it against one of the ¼-in. orifices in the cup and closing off the vacuum lead. (405)

Hydraulic valve

A 3,000 psi semiautomatic 4-day hydraulic valve (especially designed for the die-casting industry) is announced by **Sinclair-Collins Valve Co.**

Known as the E-400-X Series, the valve provides leak-free operation with water, glycol or oil-base hydraulic fluids. Activated by an integral, double-acting cylinder controlled by a Speed King single or double solenoid pilot-operated valve, the valve offers maximum operating safety, since it will not reverse itself should there be an air or electrical supply failure.

Corrosion-resistant materials are used throughout the valves. Cast Navy M bronze bodies, hardened stainless steel valve stems and replaceable seat sleeves, plus Stellite seats, assure trouble-free service life with a minimum of wear.

The valves are offered in 1, 1½ and 2 in. NPT sizes, for line pressures up to 3000 psi. 60 to 125 psi air is used for valve actuation. (406)

Ucon hydrolubes

The advantages and limitations of water-base, fire-resistant hydraulic fluids, and full information on the installation, use and maintenance of Ucon hydrolubes is contained in a booklet issued by **Carbide Chemicals Company,** Division of Union Carbide Canada Ltd. These hydraulic fluids are widely used in applications where petroleum oils would present a fire hazard. Serious fires have occurred when flammable petroleum oils from ruptured hydraulic lines have become ignited by sparks, hot surface or flame. (407)

Small bore hydraulic cylinder

A one inch diameter bore is generally the minimum size available to users of hydraulic and pneumatic cylinders. For those who require an even smaller bore, the **Airoyal Company** announces the availability of a complete line of ⅝-in bore cylinders.

They are small in size and weight, and they eliminate the need for a reducing valve on applications where small force outputs are required (i.e. push area equals 0.3 square in. Thus, at 1,000 psi line pressure, force output is only 300#, as compared with force output of 785# for 1 in. diameter bore cylinder at the same pressure).

The low volumetric displacement makes possible the use of smaller pumps and valves. The cylinders are single and double acting. They have a low pressure rating of 150 psi air and 750 psi with oil. The high pressure rating is 1,500 psi with oil. The mounting style is the universal (foot and/or flange), clevis and trunnion. (408)

Regulating valve

The evaporator pressure regulating valve No. 668) made by **Detroit Controls Corp.,** will maintain a constant evaporator pressure regardless of fluctuating suction pressure or changes in load conditions.

The valve prohibits freeze-up of water coolers, beverage coolers and other water cooling equipment by preventing the suction pressure from going below the freezing point. It will accurately maintain evap orator pressure in accordance with its setting, and thereby acomplish individual evaporator control in single or multiple systems. It is furnished with a ⅛ in. female pipe gauge connection. Canadian Rep.: Railway and Engineering Specialties, Limited. (409)

Check valve

A data sheet describing its new MS-approved ½ in. aluminum alloy check valve and full line of MS-type lightweight check valves for 3,000 psi service has been issued by the Tactair Valve Div. of **Aircraft Products Co.** Designated Series 1800, the line includes four aluminum alloy check valves that feature a 55% weight saving over steel valves. (410)

Air-powered grinder

A high speed, air-powered grinder, designated Model GA-125, has been added to the **Bellows Company** line of controlled air power work devices. With this small, compact, pencil-size grinder, speed does the work.

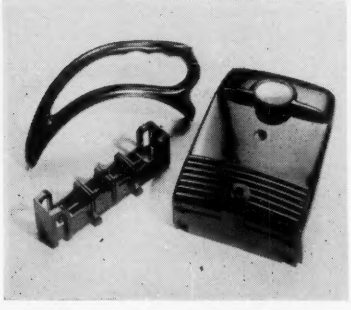
Operating at 100,000 rpm at 80# psi, it does jobs in many skilled and productive operations. Such uses include grinding, deburring, cutting, polishing, die and mold finishing, and engraving. (411)

Hydraulic fluid

A fire-resistant hydraulic fluid has been developed by **E. F. Houghton & Co.** and is intended expressly for systems operating at temperatures above 150 F, and for heavily loaded pumps and bearings. The new fluid, Houghto-Safe 1020, has greater film strength and is fortified with rust preventives and anti-foaming agents. (412)

Nonmetallic materials

(continued from page 70)



Phenolics

Phenolic plastic is the material used for these three molded parts, which benefit from its electrical insulating qualities, moldability, appearance, dimensional stability and resistance to heat, water and chemicals. In addition, cost of manufacture from this **Bakelite** phenolic is low.

Four classifications of phenolic plastics are available to meet the requirements of every designer and molder.

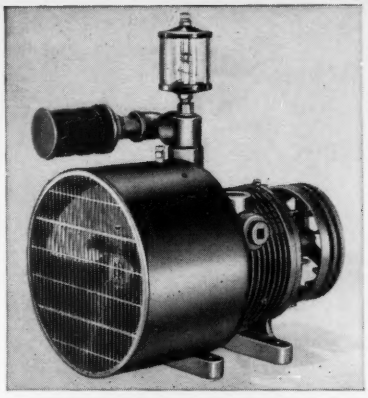
General-purpose phenolics are cellulose-filled dry granular powders which readily soften and flux under heat and pressure and can be molded into intricate shapes.

Special higher-strength phenolics have improved impact strength and moisture resistance under long periods of immersion and high temperatures.

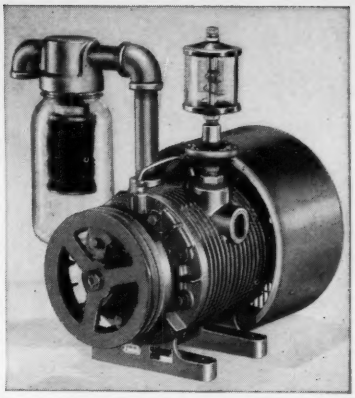
Heat-resistant phenolics are mineral-filled for use over short intermittent periods at temperatures up to 500 deg. F.

Lastly, special-purpose phenolics are made for specific requirements: "Low-Loss" phenolic is used for high-frequency electrical insulation; chemical and water-resistant phenolics have outstanding resistance to water, acids, alkalies, alcohols, oil and grease; low-frictional phenolics are "non-squeak" materials containing graphite; X-ray phenolics, opaque to X-rays, are used for shielding — a 5/16 in. thickness approximates 1.0 mm. of lead in shielding effect.

Plastic molders throughout Canada are well-equipped with modern facilities to produce various sizes and intricate shaped phenolic molded parts in any volume. A list of Canadian plastic molders is available through Bakelite Company. (413)



Compressor Model 4565-P3 to 20 p.s.i.



Vacuum Pump Model 4565-V6 to 25" hg.

Big NEW 45 c.f.m. fan-cooled Model 4565

GAST rotary vane AIR PUMPS—

Twice the capacity of previous models!

COMPRESSOR

Delivers to 45 c.f.m., to 20 p.s.i.g. continuously with 5 h.p. motor at 1750 r.p.m. At lower pressures, 3 h.p. may be used. Includes automatic lubricator, felt type intake filter.

VACUUM PUMP

Delivers to 45 c.f.m., vacuum to 25 in. hg. with 3 h.p., 1750 r.p.m. For 35 c.f.m. at 1350 r.p.m., 2 to 3 h.p. is adequate. Has heavy-duty lubricator and exhaust muffler.

WRITE TODAY for Bulletin 557-VP with performance data.

Here's new, bigger-volume air pump utility—for original equipment or plant use! Built for continuous, heavy-duty service as either a Compressor or Vacuum Pump, the Model 4565 eliminates water-cooling headaches. It's air-cooled by a 10" diameter pitch fan enclosed by cowl-guard which directs cooling air and insures safety by covering fan mounted on shaft extension.

Long-lived, efficient 5-vane rotary design delivers a positive displacement of pulseless air. No air tank is needed on compressor.

Pump is easy to mount. Drive with double v-belts eliminates precision alignment problems, and fan on pulley adds extra cooling capacity. Heavy ball bearings, with double row on drive end. Pump weight approximately 92 lbs.

Investigate Gast Model 4565—it may solve a problem for you! Gast Manufacturing Corp., P.O. Box 117 Benton Harbor, Michigan.

SUGGESTED APPLICATIONS

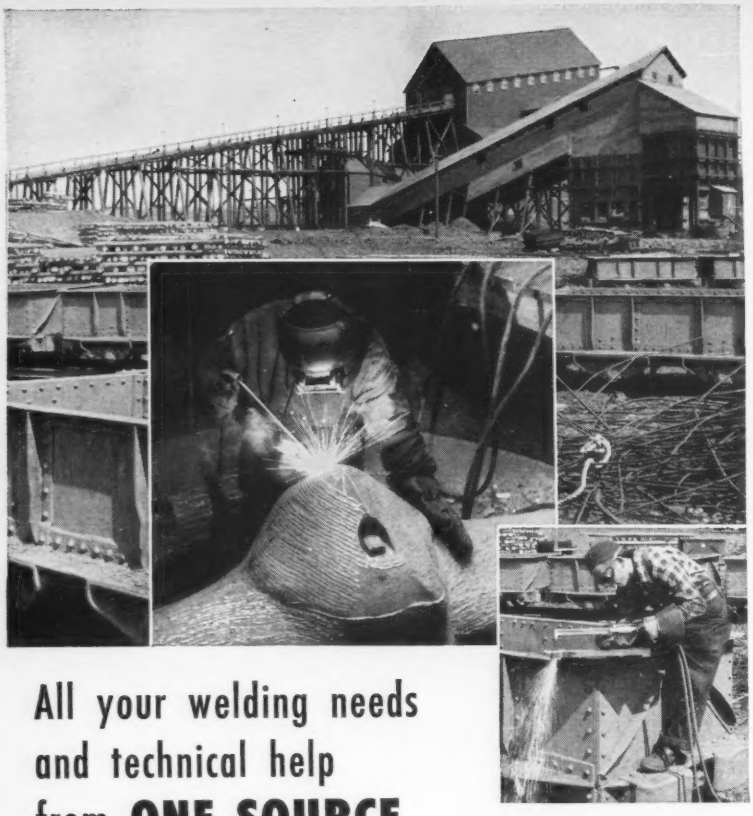
As volume source of low pressure air or vacuum, independent of plant air lines. COMPRESSOR: For air atomizing No. 5 or 6 fuel oil on burners for packaged boilers to 500 h.p., etc. VACUUM PUMP: Does the work of two smaller pumps for paper or sheet feeding to printing presses, packaging, labeling or bottle-filling machinery. Suitable for pipe-line milking machines, and for vacuum-forming large plastic sheets. Recommended for dry vacuum only.

Original Equipment Manufacturers for Over 25 Years

GAST ROTARY

- AIR MOTORS TO 4 H.P.
- COMPRESSORS TO 30 P.S.I.
- VACUUM PUMPS TO 28 IN.

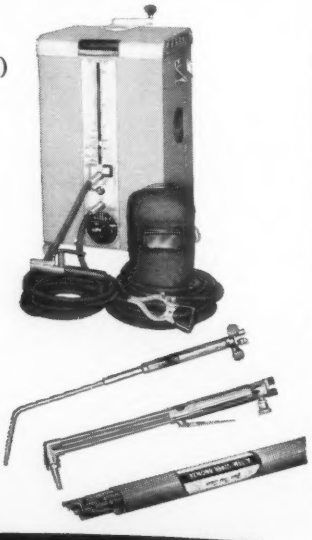
SEE OUR CATALOG IN SWEET'S PRODUCT DESIGN FILE



All your welding needs and technical help from **ONE SOURCE**

Industrial one-stop buying of all your welding and cutting equipment and supplies is as satisfactory and profitable as it is in a modern department store or shopping centre. Canadian Liquid Air offers you a complete line of:

- ☐ Welding gases (Oxygen, Acetylene, Argon)
- ☐ L.A. welding and cutting equipment
- ☐ Miller AC & DC arc welders
- ☐ Mild and stainless steel electrodes
- ☐ Wear-resistant and hard-surfacing electrodes and weldments
- ☐ Gas welding rods
- ☐ General welding supplies



Technical services, based on a half-century of welding experience, are also available.

Canadian LIQUID AIR Company
LIMITED

ST. JOHN'S, SYDNEY, HALIFAX, MONCTON, BATHURST, QUEBEC, SOREL, MONTREAL, CORNWALL, BROCKVILLE, TORONTO, HAMILTON, NIAGARA FALLS, WATERLOO, LONDON, SARNIA, WINDSOR, SUDBURY, PORT ARTHUR, WINNIPEG, REGINA, SASKATOON, EDMONTON, CALGARY, MEDICINE HAT, RED DEER, CRANBROOK, VANCOUVER, VICTORIA, KITIMAT.

Instrumentation

(continued from page 58)

Automatic printing device

Strip charts that record from a remote point the exact time or sequence in which conditions occur during process control and test work are announced by **Royson Engineering.**

These instruments eliminate the need for someone to watch charts and make identification marks. They make the job of interpreting charts more accurate after the record has been made. They do not interfere with or obscure the recording procedure. In easy-to-install kit form, they operate on any AC or DC voltage from 24 to 115 volts.

Special equipment for use with the Identichart — a Librascope indicator — makes it possible to take a finished chart and easily obtain the integration for any portion of the record. (414)

Balancing equipment

Dynamic balancing equipment specially designed for the single plane balancing of workpieces in the shape of thin discs or wheels is available from **Dawe Instruments Ltd.** (Canadian Division.)

The instrument has been designed to indicate the amount and the angular position of unbalance in rotating bodies such as discs, fans or wheels. The balancing is carried out in a single plane perpendicular to the axis of rotation of the body. The lengthy and inaccurate procedure for the static balancing of discs or wheels by the usual method of adding test weights to obtain the neutral equilibrium of the body is no longer required.

Instead, the body is rotated at high speed, on a vertical spindle held in a flexible bearing; and the vibrations produced by the unbalance are detected by an electromagnetic pickup coupled to the bearing. The electrical signals from the pickup are taken to a high gain amplifier and then to a meter, the scale of which can be calibrated in the amount of material to be added or removed to obtain balance. (415)

Computing device

A computing device that can be used in pneumatic measurement or control circuits for a variety of purposes is now being marketed by **Honeywell's Industrial Division.**

Called the Sorteberg Force Bridge, it can convert a transmitted signal from a square root flow transmitter into a linear signal, permitting the use of a flow receiver with an evenly graduated chart.

It can be used to maintain a ratio between two pneumatic signals for flow ratio control. It can also be used to multiply, subtract, divide or square pneu-

matic outputs, or to provide pressure and temperature compensation for transmitted flow signals.

The design of the instrument assures friction-free operation by the use of the feedback principle in a weighbeam and fulcrum system. (416)

Time switches

Addition of seven new time switches to its Intermatic line is announced by **International Register Co.** The new models offer more accuracy and versatility in control of electrical circuits from periods of 2 seconds to 24 hours.

Among these models are the T960 series, for 1 to 96 on-off operations every day and suited for control of pumps, recorded music and process timings. The V21000 series, a seven-day time switch is used for controlling heating and air conditioning systems, lights and fans on a weekly schedule to permit different timing periods daily, if desired. Another series, the V22000, is a two-circuit switch for use in apartment houses, stores, factories, and public buildings. A highly accurate time switch for controlling operations of 5 or 15 minute intervals during a 24-hour period is the V27000 series. Program timers are also included among the new models, the V28000 or V29000 series control 1 to 288 daily operations of bells, buzzers, and signal lights for periods of 2 to 60 seconds. Also included, is the C8300 series, a twelve-minute cycle repeater timer that can be used on fans, and similar operations. (417)

Time totalizer

An electrical stop clock featuring instantaneous electrical reset (1/10 sec) and accuracy of .02 of 1%, has been announced by **Cramer Controls Corporation.**

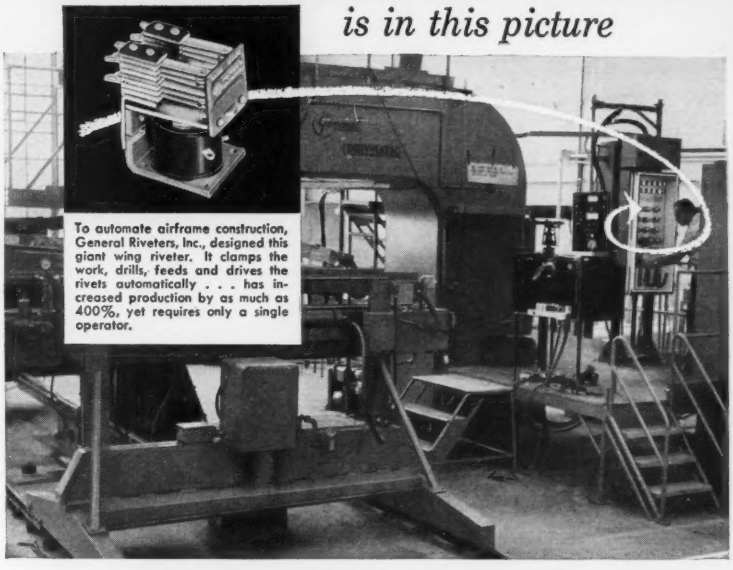
Designated Type 691, a dust-tight commercial model and a military version are offered. The military unit is hermetically sealed and designed to meet stringent vibration, shock and environmental specs.

It is available for either local or remote reset. Where local reset is desired, a pushbutton is provided on bezel. On the sealed timer, pushbutton actuates reset solenoid through a bellows.

Load switches rated 5 A. to 250 ac resistive, operated from cams on either fast or slow pointer shafts, can be supplied. Number of pulses per second or minute, and duration of pulses are factory set. With switches on both fast and slow pointer shafts (wired in series) it is possible to use the 691 as a highly precise time delay or interval timer.

Available ranges are 60 seconds in 1/100 sec, 60 minutes in 1/100 min, and 60 minutes in seconds. Ratings include all standard voltages at 50 and 60 cycles, 115 volt 400 cycles (with dc clutch) and various dc voltages. (418)

Potter & Brumfield *engineering is in this picture*



To automate airframe construction, General Riveters, Inc., designed this giant wing riveter. It clamps the work, drills, feeds and drives the rivets automatically . . . has increased production by as much as 400%, yet requires only a single operator.

P&B RELAYS AUTOMATE THIS GIANT RIVETER *for New Lockheed Electra Wings...*

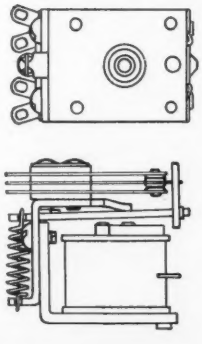
This new automatic riveter will be used to make wings for the new Lockheed Electra, a prop-jet luxury liner, as well as many other modern aircraft. The heart of this riveter is a relay circuit that "takes orders" from a pattern of holes punched in 35 mm film strips.

General Riveters, Inc. selected the GA Series P&B relay for the control circuits of this riveter because of its unusual dependability and versatility. In adapting this relay to a specific application, P&B's engineers again demonstrate how 25 years of creative engineering can pay off by providing a standard type or completely new relay to solve your particular problem. Write today for new compact catalog or engineering consultation.

P&B Representatives in Canada: Aeromotive Engineering Products, Montreal
A.T.R. Armstrong, Ltd., Toronto • Charles L. Thompson, Ltd., North Vancouver

ENGINEERING DATA GA SERIES RELAY

Multiple Leaf AC or DC



CONTACTS
Material: 3/16" fine silver (other contact materials can be furnished for specific applications)
Rating: 5 amp. 115 V. 60c non-inductive load
Arrangements: 4 Form C Max., AC, 6 Form C Max., DC
Breakdown: 1000 V. RMS between all elements

COIL
Resistance: 30,000 ohms max.
Power Req'd: 6 W. max., 2 W. min. DC at 25° C. ambient
V range: DC to 110 V.; AC to 230 V.

DIMENSIONS, MAX.
1-23/32" L. x 1-1/16" W. x 1-25/32" H.

MOUNTING DATA 4 tapped #6-32 holes, .750" x .875" o.c.; 1 tapped #8-32 core

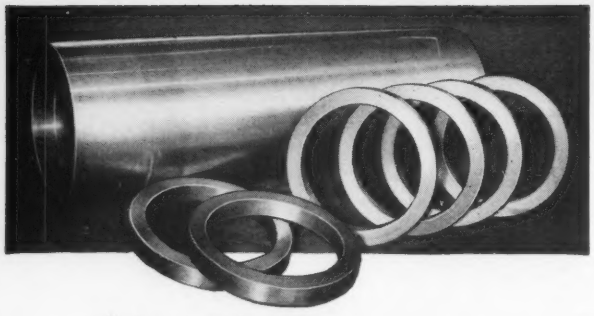
ENCLOSURES Hermetically sealed, octal plug: 2-17/32" x 1-29/32" x 1-25/32"
Multiple solder header and miniature plug-in: 2-15/32" x 1-29/32" x 1-25/32"
Special container required for 6 Form C

TERMINALS Contacts: two #16 AWG wires
Coil: two #20 AWG wires

Potter & Brumfield, inc.

See our catalog in Sweet's Product Design File

PRINCETON, INDIANA *Subsidiary of* AMERICAN MACHINE & FOUNDRY COMPANY
Manufacturing Divisions also in Franklin, Ky. and Laconia, N. H.



Centricast

. . . alloy steel, bronze
and alloy iron tubular castings

Notable Improvement in Machine Design

How to improve the strength or wearing quality of certain machine parts without materially increasing costs has been a problem for many design engineers. Centrifugal casting by Kennedy is helping to solve the problem. Kennedy centricast metals are extremely dense, with excellent physical properties.

Cylinders of various diameters, lengths and wall thicknesses . . . supplied rough machined on inside and outside diameters, as semi-finished blanks, or as assembly parts fully machined to specifications, such as cylinder liners, ring gears, cages for roller or ball bearings, straight or flanged bushings and other parts.

KENNEDY'S OWEN SOUND

THE WILLIAM KENNEDY & SONS LIMITED

A DIVISION OF MILLSPAUGH LIMITED, SHEFFIELD, ENGLAND

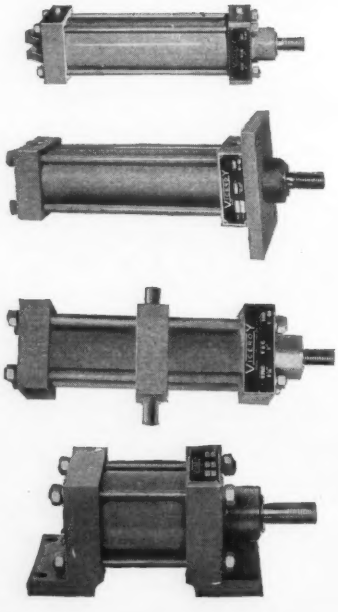
OWEN SOUND, ONTARIO

Montreal: 1224 St. Catherine St. W.

Haileybury: John H. Brumell

VICEROY

CYLINDERS



When you look at the finer points of construction that are so apparent in VICEROY cylinders, you will be convinced that for rugged, dependable service you should always choose **VICEROY.**

END CAPS: Solid or Welded Steel depending on diameter of bore.
CYLINDERS: BARREL DRAWN SEAMLESS BRASS TUBING. (Drawn Seamless steel tubing can be supplied if required and specified.)
PISTONS DURAL: For corrosion resistance and lightness.
PISTON RODS: Stainless Steel for added strength and corrosion resistance.
PISTON PACKINGS: Best Chrome Tanned Leather (or other materials most suitable for service specified).
PACKING GLANDS: Chevron Type of grade suitable for service specified.
SPECIALS: Variations from standard cylinders can be supplied as specials and will be quoted on application.

CATALOGUE ON REQUEST

Engineering Division VICEROY West Toronto Canada
MANUFACTURING COMPANY LIMITED

7482

Machine tools

(continued from page 62)

Wire stripper

Three new-design wire strippers are announced by **Ideal Industries Inc.** (in Canada—Irving Smith Limited). They will strip all types of film-insulated fine gauge wire from AWG No. 20 to No. 50. There are two bench type and one portable model and all are motor driven.

Twin cones of fibre glass brushes strip the insulation cleanly and quickly without damage to the wires. Stripping can be done to within ⅛ in. from the body winding and the operation is simple and efficient. The fibre glass brushes will handle all sizes of wire and can be dressed whenever necessary by means of a handy tool. (395)

Vertical broaching machine

This machine is an addition to the **B.S.A.** machine tool range. It is designed to let the broaching process (both internal and external) be used when the high initial cost of existing machines would make it prohibitive.

The comparatively low cost of the machine has been achieved by simplicity, sparing nothing which effects accuracy, rigidity and reliability.

The machine is entirely self-contained and occupies a floor space of only 31 x 33½ in.

Basically, it is a combined table and gearbox unit supported on four robust pillars carried on a cast iron bed plate.

The vertical lead screws have journal and thrust bearings in the table unit and journal bearings in the base. Exact alignment of base table is assured since all the bores are machined with both members mounted closely side by side in one jig. (396)

Boring tools

The combining of multi-diameter boring operations and even chamfering in the same tool is made easy with the new micro-adjustable boring tools available from **Wesson Company.** Throw-away inserts requiring no grinding of any kind are used in each location. The anvil on which each insert is locked is micro-adjustable in and out. Each division of the screw-dials represents exactly .001 in. on diameter. Once set on the job, the anvils or bars require no adjustment. When inserts are dull, they are simply indexed to a new and unused edge or interchanged. Precision grinding of throw-away inserts eliminates need for adjustment when inserts are changed.

These boring bars have a wide range of applicability to all types of turret lathes, horizontal or vertical, where precision finishes are desired with minimum tool cost and down time. (397)

Microhoning machine

A new honing machine, designed to fill the gap between the large mass producer and the small shop, is now being produced by **Micromatic Hone Corporation.** Designated the 150, it is priced within the range of a manufacturer with limited capital or of one with low production requirements.

The basic micromatic machine, suitable for both internal and external microhoning, includes automatic stroking and hydraulic initial tool expansion and collapse as standard features. Other features are: adjusting head for manual tool feed expansion and stone wear compensation; spindle mounted on hydraulically actuated reciprocating carriage with a 12-in. maximum stroke; variable speed drive for spindle rotation; rigid work table support; provisions for gravity coolant drainage.

Additional automatic "packages" can be added for partial or full automation. These are automatic feed control and stone wear compensation; automatic sizing, and automatic work handling. Canadian representative is Micromatic Hone Limited. (398)

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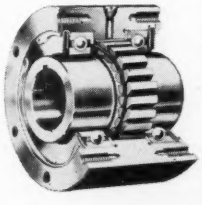

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Electrics

(continued from page 42)

Capacitors

Subminiature ceramic capacitors are being designed and produced by **Mucon Corporation** with a variety of lead arrangements of wire, ribbon or tab leads for use in transistor circuitry, radio and tv, radar and guided missiles.

For extremely tight space applications, where high capacitance is required, connecting leads may be ordered of any desired number or thickness (radially or axially arranged) or in any other configuration to provide the most efficient assembly operation. Lower inductance or ultra-high frequency is obtained with ribbon leads. (399)

Magnetic drive

A magnetic drive which provides a flexible slip type drive between a motor and its load, in a range from fractional to over 50 hp is available from the **Whitney Chain Company.**

The cylindrical design of the Whitney-Tormag drive is adaptable to the new NEMA frame specifications, permitting the drive unit to be smaller in diameter than an electric motor of similar horsepower. It consists of a magnetic rotor and a bimetallic rotor, mounted face to face with an open space between them.

The unit provides shockless, vibration-free drive, without mechanical or fluid coupling. It can handle heavy, unbalanced or fluctuating loads and provides 95% efficiency at rated horsepower.

It remains unaffected by exterior temperatures from 250 to —60 F, is fully reversible, and can be used as a dynamic brake. The motors are powered to actual running requirements; no oversize provision or special winding is necessary for starting or stalling demands.

Overload protection is provided for the driving motor. It can be run in full stall indefinitely without harming the motor or the magnetic drive. (400)

Sampling switch

A high-speed sampling switch made by **Applied Science Corp.** provides single pole sampling of 60 contacts at rates up to 30 rps. A torque of only 3 oz is required. This compact switch (type AB) is built to provide long life and is designed for direct mounting to standard servo appliance frames. Complete shielding is provided, with provision for potting all wiring when required. It has ball bearing construction throughout, with a glass base contact plate and pure coin silver contacts. (401)

Lamp transformer

Introduction of a constant wattage mercury vapor lamp transformer for outdoor operation of two HI 400 watt lamps is announced by **Sola Electric Co.**

The two-lamp transformer provides line current surge during starting period limited effectively to no more than normal, full load value; regulated lamp wattage and light output; open circuit protection; no lamp outages in the face of severe line voltage dips; and the elimination of primary taps. It is designed for reliable starting and operation in temperatures down to —30F. (402)

Ferrite cores

A ferrite, full-round deflection yoke core for use in tv picture tube assemblies is announced by the **Allen-Bradley Co.**

The yoke core is pressed as a ring of perfectly uniform section and circularity. It is then "cracked" into two halves for later assembly over deflection coils and fitting to the tube.

These circular yokes eliminate the grinding, fitting and setting necessary with quarter-round sections. Inner and outer surfaces are always concentric and parallel. The result is better convergence, greater color purity and reduced assembly time. (403)

"D" frame motor

Class A, F, and H windings cover all temperature and power requirements in the "D" frame motor announced by **Rotron Mfg. Co. Inc.** Extra heavy stainless steel bearing retainers protect ball bearings at extremely low storage temperatures.

Accurately spring loaded bearings ensure quiet running. Special finishing technique on airgap surfaces protect motor from humidity conditions. Laminated cores of thin gauge give high efficiency at frequencies up to 2,000 CPS.

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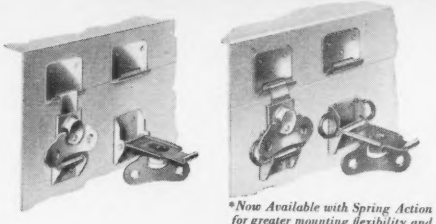

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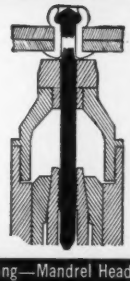
Photograph of POP RIVET application

Rivet and Tool in Position Before Setting



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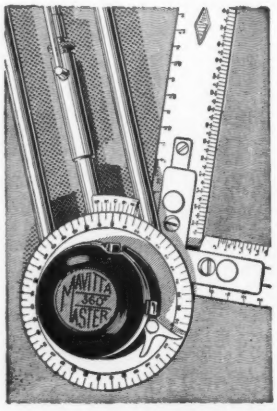

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Letters

Readers' viewpoints . . .

Plastic tooling

I was interested to read the mention you made of the most extensive and complete bibliography yet compiled on the subject of plastic tooling in your June edition of Design Engineering.

I wonder if you would please forward my request for a copy of this bibliography to the publishers.

from H. Wilkinson, Librarian, Canadian General Electric Co. Ltd., 1130 Boulevard Charest, Quebec 8, Que.

(We wrote and asked the ASTE to forward a copy—Ed.)

Ultrasonic processing

In the October 1955 issue of the Design Engineering magazine on page 40 there was an article under the heading "Homogenize and mix without tears" by F. Rose.

We would like to know if you could supply us with the name of this piece of equipment or the name of the supplier.

from J. L. Powers, Methods Dept., Electric Auto-Lite Ltd., Sarnia, Ontario.

(The address of the supplier, 155 Balmoral Ave., Toronto 7, was duly forwarded. It is interesting to note that a back-issue of Design Engineering was scanned in this way—Ed.)

Air filters

On page 32 of the March 1957 issue of Design Engineering, reference is made to the Far-Air High Velocity Filter, and it would be appreciated if you could inform us as to the manufacture of these filters.

from R. Otsuki, P.Eng., Sr. Motor Engineer, Reliance Electric & Engineering (Canada) Ltd., Welland, Ont.

(We informed our correspondent that the name of the company is: Elliott Co. Inc., Jeannette, Pa.—Ed.)

Pressure measurement

(We received author Cunard's answer to the query last month from Walter Wilson. This is rather too long for publication, but a copy will be sent to any reader upon request—Ed.)

Light-gas gun

It has come to my attention that the April 1957 issue of your publication contained an article dealing with one of the research facilities of this laboratory. Could you please forward a copy of that issue for our retention.

from Daniel S. Wenz II, Aeronautical Information Specialist, National Advisory Committee for Aeronautics, Ames Aeronautical Laboratory, Moffett Field, Calif.

NEW

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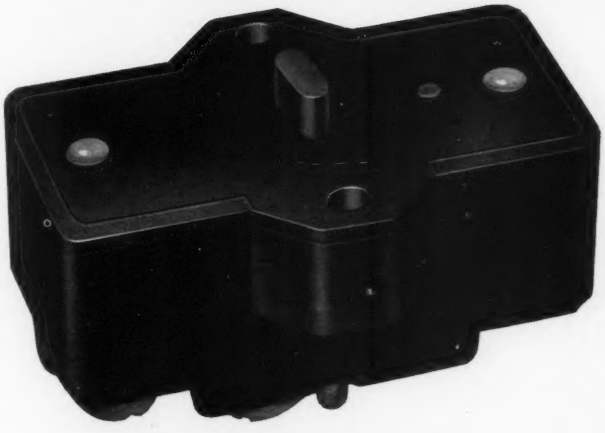
multiple circuit switch for machine tools



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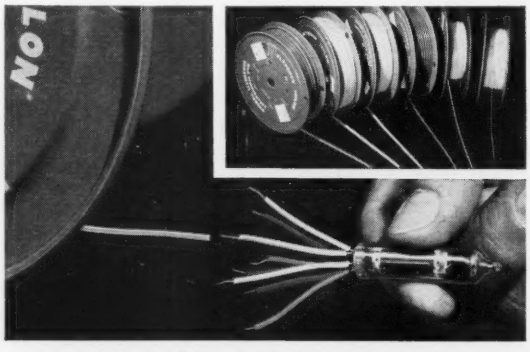

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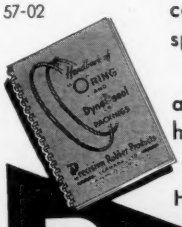

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Editorial

Plans for a technical film index

One of our readers recently wrote to us (see Letters page, Design Engineering, March 1957) on the subject of a comprehensive technical film index.

There is no doubt that industrial films are of the utmost value, for educational and recreational purposes and for training technical or sales personnel.

Because of this, Design Engineering proposes to gather information for a comprehensive technical film index, stating where the film is available, on what subject, the length and film size, whether black and white, silent or in sound and so forth. Each month space will be devoted to films available.

Readers are therefore asked to let us have details of films that they (or their companies) have available on subjects of direct interest to the design engineer. Typical examples recently received in the office are: "Phenolic Molding Story," a 20-minute, 16mm black and white film (issued by Bakelite); "Speeding the Distribution of Engineering Drawings by Xerography," a 16mm, 15-minute sound movie in color (The Haloid Company).

Canadian Design:

We are in complete agreement with J. Carl Wilson (president of J. A. Wilson Lighting & Display Ltd.) when he states, as he did recently, that we must stand on our own feet and design and develop products to suit the specific needs of this country.

His address was before a large group of illuminating engineers at their Canadian regional conference held recently in Niagara Falls.

The theme of his address was: "Creativity in the Canadian Lighting Industry." Mr. Wilson stated that as an industry it is our obligation to society to continue to provide advances, rather than simple extensions to an old problem. Since it has been proved that the ability to create ideas is inherent in us all, the degree of our success is in direct proportion to our faith in ourselves. The implication was that creativity is a force as yet unleashed that could be readily applied to many of our modern industrial problems.

These remarks are of particular interest to Design Engineering because we have continually stressed the importance of more creativity in Canadian design.

William Morse.

THE AVRO ARROW

The name selected for the still secret AVRO CF-105 is symbolic of the pointed missile concept of this supersonic interceptor, being developed as the successor to the AVRO CF-100.

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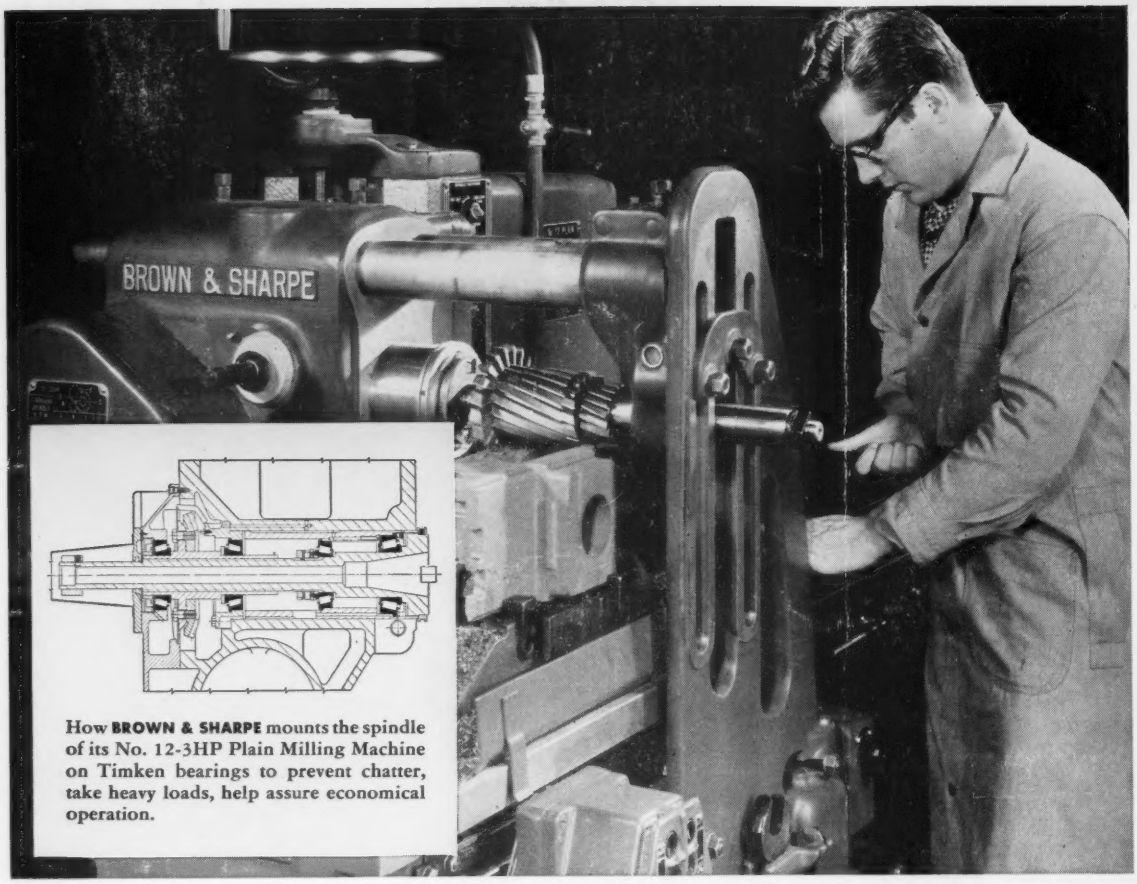

How **BROWN & SHARPE** mounts the spindle of its No. 12-3HP Plain Milling Machine on Timken bearings to prevent chatter, take heavy loads, help assure economical operation.

Climb mills both ways . . . TIMKEN bearings prevent chatter in heavy cutting

TO make heavy cuts without chatter, Brown & Sharpe mounts the spindle of its No. 12-3HP Plain Milling Machine on two Timken tapered roller bearings. For smooth power transmission, they use four Timken bearings in the bevel gear drive to the spindle. And to take climb milling's pulsating loads, two Timken bearings are used in the feed screw drive. Result—production milling is fast and accurate. Here's why.

• SPINDLE RIGIDITY MAINTAINED

Timken bearings hold the spindle in positive alignment. Their tapered design lets them take *both* radial and thrust loads in any combination. And full line contact between rollers and races gives Timken bearings extra load-carrying capacity.

• HEAVY LOADS ABSORBED

Rollers and races on Timken bearings are case-carburized to have a hard, wear-resistant surface over a tough, shock-resistant core. They take heavy loads and come back for more.

• FRICTION VIRTUALLY ELIMINATED

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